आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

IFTM University, Moradabad, Uttar Pradesh

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Structure & Evaluation Scheme of

B.Ed. Integrated

B.Sc.-B.Ed.

(4 Years Integrated Education Programme)

[w.e.f Session 2022-23]

(Based on the recommendations of NEP 2020)

Programme	B.Sc.-B.Ed. (Integrated Education)
Course Level	UG Dual Degree
Duration	Four years **(Eight semesters)** Full Time
Medium of Instruction	English/Hindi
Minimum Required Attendance	75%
Maximum Credits	194-212

	Evaluation Scheme

	Internal	External	Total
Theory	25	75	100
Practical	25	75	100
Seminar/Training	100	--	100
Project/ Dissertation	25	75	100

Programme Objectives (POs):

1. The programme very well fits into the newly proposed programme structure for differentgraduate programmes.
2. The programme offers exit routes after the first, second, third, and fourth year.
3. In the third year of the programme, students can opt for two major subjects leading toB.A. /B.Sc. or one subject major with education leading to B.Ed. Integrated Degree.
4. The programme provides knowledge of the subject, and the opportunity to learn andpractice its pedagogy simultaneously.
5. Every teacher education course includes either research-orientation or practicum activitiesto ensure that what students have learned in theory must also practice in the field.
6. The programme lays a significant emphasis on acquiring teaching skills and schoolexperiences.
7. The programme is economically viable for educational institutions, and academicallyenriching for the learners.
8. The programme includes contemporary trends and practices in the school education sectorand also caters to the needs of the prospective employer.

Programme Outcomes(POs):

This programme specifically aims to prepare teachers:

1. Use learner centered teaching methods as such and with modification in future.
2. Develop an understanding of paradigm shift in conceptualizing disciplinary knowledge in school curriculum.
3. Identify the challenging and overcoming gender inequalities in school, classroom, curricula, textbook, social institutions etc.so as to satisfy local needs.
4. Develop competencies among student-teachers to select and use appropriate assessment strategies for facilitating learning.
5. Engage student-teachers with self, child, community and school to establish close connections between different curricular areas.
6. Enable student-teachers to integrate and apply ICT in facilitating teaching-learning process and in school managementso as to meet global needs thus satisfying national and global needs.

7. Systematize experiences and strengthening the professional competencies of student-teachers.
8. Provide first-hand experience of all the school activities in order to meet national and global needs.

Program Specific Outcomes (PSOs) :

1. able to integrate theoretical and practical knowledge of their respective subject in classroom practice.

2. apply their knowledge of core content and pedagogy to set goals and objectives for learning based on Curriculum, and design instruction that engages students in meaningful learning activities.

3. appreciate the diversity of learners and create appropriate learning environment to assure a focus on learning of all students.

4. deliver meaningful learning experiences for all students by integrating their knowledge and applying a variety of communication, instructional, and assessment strategies in their teaching.

5. demonstrate their commitment for continuous self-improvement by engaging in professional development activities and collaborative and reflective practices to improve teaching and learning that contribute to the revitalization of the teaching profession.

6. demonstrate leadership qualities by participating in the curriculum initiatives, student support and school management systems.

7. demonstrate their associations with school, family and community to foster student and community progression.

8. integrate ICT in teaching-learning and assessment process to enrich professional practice.

9. engage in value based and culturally responsive teaching practices.

Course Structure of B.Sc.-B.Ed.

This programme is designed in such a way that it will seamlessly fit with the scheme of thenewly restructured graduate programmes of different disciplines in the State of UttarPradesh. This B.Ed. Integrated (B.Sc.-B.Ed.) programme discards the ongoing principles of curriculumdesign that 'once a candidate chosen a stream, s/he has to stick it to it till last' or 'only oneexit route at the end, and no escape in between'. Instead, the proposed programme structureoffers varied flexibility to the students in terms of course choice and exit routes. Thefollowing will detail this unique conception:

Structure, Syllabus & Evaluation Scheme

B.Ed. Integrated (B.Sc.-B.Ed.) Programme
Course Structure
Semester-I

Year: First			**Semester:** First				
Subject Description	**Subject Code**	**Subject Title (Theory & Practical)**	**Credits**	**Continuous Internal Evaluation (CIE)**	**University Exam. (UE)**		**Max. Marks**
					Theory	**Practical**	
Choose any TwoSubjects (Core Course)							
Physics	B010101T	Mathematical Physic & Newtonian Mechanics	04	25	75	--	100
	B010102P	Mechnical Properties of Matter	02	25	--	75	100
Chemistry	B020101T	Fundamental Chemistry	04	25	75	--	100
	B020102P	Quantitative Analysis	02	25	--	75	100
Mathematics	B030101T	Differential Calculus & Integral Calculus	04	25	75	--	100
	B030102P	Practical	02	25	--	75	100
Botany	B040101T	Microbiology & Plant Pathology	04	25	75	--	100
	B040102P	Techniques in Microbiology & Plant Pathology	02	25	--	75	100
Zoology	B050101T	Cytology, Genetics and Immunology	04	25	75	--	100

	B050102P	Cell Biology and Cytogenetics Lab	02	25	--	75	100
Teacher Education Course							
Teacher Education Course **[TEC-1]**	E030101T	Development of Education in India and Contemporary Issues	**6**	**25**	**75**	**--**	**100**
Pedagogy (Vocational Course)							
Teacher Education Course **[PS-1]**	E030102T	Pedagogy of Sciences	**3**	**25**	**75**	**--**	**100**
Co-Curricular Course							
Co-Curricular Course **[CCC-1]**	Z010101T	Food, Nutritionand Hygiene	**2**	**25**	**75**	**--**	**100**
Industrial Training							
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B.Sc.-B.Ed. (Integrated Teacher Education) Programme

Course I

(Theory)

Programme/Class:**Certificate**	Year:**First**	Semester:**First**
Subject:**Physics**		
Course Code: **B010101T**	CourseTitle: **Mathematical Physics & Newtonian Mechanics**	
Credits:**4**	CoreCompulsory/ Elective	
Max.Marks: **25+75**	Min.PassingMarks: **40**	

Objective: The aim of this course is to familiarize students about Indian ancient Physics and contribution of Indian Physicists, in context with the holistic development of modern science and technology, should be included under Continuous Internal Evaluation (CIE).

TotalNo.ofLectures-Tutorials-Practical(inhoursperweek):L-T-P:**4-0-0**

Unit	Topics	
	PARTA **BasicMathematicalPhysics**	
I	*Introduction to Indian ancient Physics and contribution of Indian Physicists,in context with the holistic development of modern science and technology,shouldbeincludedunderContinuousInternalEvaluation(CIE).* **VectorAlgebra** Develop skills to understand the basis of Coordinate rotation, reflection and inversion as the basis for defining scalars, vectors,pseudoscalarsand pseudo-vectors (include physical examples). Component form in 2D and 3D.Geometrical and physical interpretation of addition, subtraction, dot product, wedge product, crossproduct and triple product of vectors. Position, separation and displacement vectors for skilldevelopment and employability.	7

II	**Vector Calculus** Geometrical and physical interpretation of vector differentiation, Develop skills to understand the basis of Gradient, Divergence and Curland their significance. Vector integration, Line, Surface (flux) and Volume integrals of vectorfields. Gradient theorem, Gauss-divergence theorem, Stoke-curl theorem, Greens theorem andHelmholtz theorem (statement only). Introduction to Dirac delta function for skill development and employability.	8
III	**Coordinate Systems** 2D & 3D Cartesian, Spherical and Cylindrical coordinate systems, basis vectors, transformationequations. Expressions for displacement vector, arc length, area element, volume element, gradient,divergence and curl in different coordinate systems. Components of velocity and acceleration indifferent coordinate systems. Examples of non-inertial coordinate system and pseudo-acceleration for skilldevelopment and employability.	8
IV	**Introduction to Tensors** Principle of invariance of physical laws w.r.t. different coordinate systems as the basis for definingtensors. Coordinate transformations for general spaces of nD, contravariant, covariant &mixedtensors and their ranks, 4-vectors. Index notation and summation convention. Symmetric and skewsymmetrictensors. Invariant tensors, Kronecker delta and Epsilon (Levi Civita) tensors.Develop skills to understand the Examples of tensors in physics for skilldevelopment and employability	**7**
	Part-B **Newtonian Mechanics & Wave Motion**	
V	**Dynamics of a System of Particles** Review of historical development of mechanics up to Newton.Develop skills to understand the basis ofBackground, statement and criticalanalysis of Newton's axioms of motion. Dynamics of a system of particles, centre of mass motion,and conservation laws & their deductions. Rotating frames of reference, general derivation of originof pseudo forces (Euler, Coriolis & centrifugal) in rotating frame, and effects of Coriolis forceskilldevelopment and employability.	8
VI	**Dynamics of a Rigid Body** Angular momentum, Torque, Rotational energy and the inertia tensor. Rotational inertia for simple bodies (ring, disk, rod, solid and hollow sphere, solid and hollow cylinder, rectangular lamina). The combined translational and rotational motion of a rigid body on horizontal and inclined planes. Elasticity, relations between elastic constants, bending of beam and torsion of cylinderfor skill development and employability.	8
VII	**Motion of Planets & Satellites** Develop skills to understand the basis oftwo particle central force problem, reduced mass, relative and centre of mass motionand its employability.Newton'slaw of gravitation, gravitational field and gravitational potential. Kepler's laws of planetary motionand their deductions. Motions of geo-synchronous & geo-stationary satellites and basic idea ofGlobal Positioning System (GPS)for skill development and employability.	**7**

VIII	**Wave Motion** Develop skills to understand the basis of Differential equation of simple harmonic motion and its solution, use of complex notation, dampedand forced oscillations, Quality factor. Composition of simple harmonic motion, Lissajous figures.Differential equation of wave motion. Plane progressive waves in fluid media, reflection of wavesand phase change, pressure and energy distribution. Principle of superposition ofwaves, stationarywaves, phase and group velocityfor skill development and employability.	7

CourseOutcomes(COs)

CO1: Recognizethedifferencebetweenscalars,vectors,pseudo-scalarsandpseudo-vectors.

CO2: Understandthephysicalinterpretationofgradient,divergenceandcurlskilldevelopment and employability.

CO3:ComprehendthedifferenceandconnectionbetweenCartesian,sphericalandcylindricalcoordinatesystems.

CO4: KnowthemeaningofA-vectors,KroneckerdeltaandEpsilon(LeviCivita)tensors.

CO5: Studytheoriginofpseudooforcesin rotatingframe skilldevelopment.

CO6: Studytheresponseoftheclassicalsystemstoexternalforces andtheirelasticdeformation.

CO7: Understandthedynamicsof planetarymotionandtheworkingofGlobal PositioningSystem(GPS)skill development.

CO8: ComprehendthedifferentfeaturesofSimpleHarmonicMotion(SHM)andwavepropagation.

Mapping Course Outcomes leading to the achievement of Programme Outcomes:
(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO 1	2	1	2	1	1	2	2	1
CO 2	2	2	2	2	1	1	1	2
CO 3	1	1	1	2	1	2	2	1
CO 4	1	1	2	1	1	1	1	1
CO 5	1	2	1	1	2	2	2	1
CO 6	1	1	1	2	1	1	2	2
CO 7	1	1	1	1	2	1	2	2
CO 8	1	1	1	2	1	1	2	1

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship
CO1	3	1	1
CO2	3	2	1
CO3	3	1	1
CO4	3	2	1
CO5	3	1	1
CO6	3	2	1
CO7	3	1	1
CO8	3	2	1

Suggested Readings

PART A

1. Murray Spiegel, Seymour Lipschutz, Dennis Spellman, "Schaum's Outline Series: Vector Analysis", McGraw
1. Hill, 2017, 2e
2. Shanti Narayan, P.K. Mittal, "A Text Book of Vector Analysis", S. Chand Publishing, 2010
3. Shanti Narayan, P.K. Mittal, "A Text Book of Vector Calculus", S. Chand Publishing, 1987, 4e

PART B

1. Charles Kittel, Walter D. Knight, Malvin A. Ruderman, Carl A. Helmholz, Burton J. Moyer, "Mechanics (In SI
1. Units): Berkeley Physics Course Vol 1", McGraw Hill, 2017, 2e
2. Richard P. Feynman, Robert B. Leighton, Matthew Sands, "The Feynman Lectures on Physics - Vol. 1",
3. Pearson Education Limited, 2012
4. Hugh D. Young and Roger A. Freedman, "Sears &Zemansky's University Physics with Modern Physics",
5. Pearson Education Limited, 2017, 14e

4. D.S. Mathur, P.S. Hemne, "Mechanics", S. Chand Publishing, 1981, 3e

Suggestive Digital Platforms / Web Links

1. MIT Open Learning - Massachusetts Institute of Technology, https://openlearning.mit.edu/
2. National Programme on Technology Enhanced Learning (NPTEL), https://www.youtube.com/user/nptelhrd
3. Uttar Pradesh Higher Education Digital Library, http://heecontent.upsdc.gov.in/SearchContent.aspx
4. Swayam Prabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/program/current_he/8

This course can be opted as an Elective by the students of following subjects

Open to all

Course Prerequisites

Physics in 12th / Mathematics in 12th

Suggested Equivalent Online Courses

1. Coursera, https://www.coursera.org/browse/physical-science-and-engineering/physics-and-astronomy
2. edX, https://www.edx.org/course/subject/physics
3. MIT Open Course Ware - Massachusetts Institute of Technology, https://ocw.mit.edu/courses/physics/
4. Swayam - Government of India, https://swayam.gov.in/explorer?category=Physics
5. National Programme on Technology Enhanced Learning (NPTEL), https://nptel.ac.in/course.html

Further Suggestions

In End-Semester University Examinations, equal weightage should be given to Part A (units I to IV) and Part

B (units V to VIII) while framing the questions.

B.Sc.-B.Ed. (Integrated Teacher Education)
Programme
Course II
(Theory)

Programme/Class:**Certificate**	Year:**First**	Semester:**First**
Subject:**Physics**		
CourseCode:**B010102P**	CourseTitle: **MechanicaPropertiesofMatter**	
Credits:**2**	CoreCompulsory/ Elective	
Max.Marks: **25+75**	Min.PassingMarks:40	

Objective: The main goal of this course is to share the knowledge to the students about the Experiments. The students will get a better understanding of the concepts studied by them in the theory course and correlate with experimental observations.

TotalNo.ofLectures-Tutorials-Practical(inhoursperweek):L-T-P:**0-0-4**

Unit	Topics	No.of Lectures
	LabExperimentList 1. Develop skills to understand the Moment ofinertiaofaflywheel 2. Moment ofinertia ofanirregularbodybyinertiatable 3. Modulus ofrigiditybystatisticalmethod(Barton'sapparatus) 4. Modulusofrigiditybydynamicalmethod(sphere/disc/Maxwell'sneedle) 5. Develop skills to determine theYoung's modulus bybendingof beam 6. Young'smodulusandPoisson'sratiobySearle'smethod 7. Poisson'sratioofrubber byrubber tubing 8. Surfacetensionof waterbycapillaryrise method 9. Develop skills to determine the SurfacetensionofwaterbyJaeger's method 10. Coefficient ofviscosityofwaterbyPoiseuille'smethod 11. Accelerationdueto gravitybybarpendulum 12. Frequencyof ACmains bySonometer 13. Height ofa buildingbySextant 14. Studythewaveformofanelectricallymaintainedtuningfork/alternatingcurrentsource withthe helpof cathoderayoscilloscope.	60
	CourseOutcomes(COs) CO1: Experimental physics has themost striking impact onthe industry whereverthe instruments are	

usedtostudyanddeterminethemechanicalproperties.
CO2: Develop skills for Measurementprecisionandperfectionisachievedthrough LabExperiments.
CO3:OnlineVirtualLabExperimentsgiveaninsightinsimulationtechniquesandprovideabasisformodeling.

OnlineVirtualLabExperiment

List /Link Virtual Labs at Amrita VishwaVidyapeethamhttps://vlab.amrita.edu/?sub=1&brch=74

1. Torqueand angularacceleration ofa flywheel
2. Torsionaloscillationsindifferentliquids
3. Momentofinertiaofflywheel
4. Newton'ssecondlaw ofmotion
5. Ballisticpendulum
6. Collisionballs
7. Projectilemotion
8. Elasticandinelasticcollision

1. B.L.Worsnop, H.T.Flint,"AdvancedPractical Physics for Students", Methuen&Co.,Ltd.,London,1962,9e
2. S.Panigrahi,B.Mallick,"EngineeringPractical Physics", CengageLearningIndiaPvt.Ltd.,2015,1e
3. S.L.Gupta,V.Kumar,"PracticalPhysics",PragatiPrakashan,Meerut,2014,2e

Course BookspublishedinHindimaybeprescribedbythe Universities.

SuggestiveDigitalPlatforms/WebLinks

1. Virtual Lab sat Amrita Vishwa Vidyapeetham, https://vlab.amrita.edu/?sub=1&brch=74
2. Digital plat forms of other virtual labs

This coursecanbeoptedasanElectivebythestudentsoffollowingsubjects

Botany/ Chemistry/ ComputerScience/Mathematics/ Statistics/ Zoology

CoursePrerequisites

Opted/ Passed Semester I, Theory Paper-1 (B010101T)

SuggestedEquivalentOnlineCourses

FurtherSuggestions

- The institution may add/ modify/ change the experiments of the samest and ardinthe subject.
- The institution may suggest a minimum number of experiments (say6) to be performed by each student per semester from the Lab Experiment List.
- The institution may suggest a minimum number of experiments (say3) to be performed by each student per Semester from the Online Virtual LabExperiment List/Link.

B.Sc.-B.Ed. (Integrated Teacher Education) Programme

Course I

(Theory)

Programme/Class: **Certificate/ BSc BEd**	Year: **First**	Semester: **First**
Subject: **Chemistry**		
Course Code: **B020101T**	Course Title:**Fundamentals of Chemistry**	

Objectives:

Periodic trends, arising from the arrangement of the periodic table, provide students with an invaluabletool to quickly predict an element's properties. Reaction mechanism gives the fundamental knowledge ofcarrying out an organic reaction in a step-by-step manner. Students will enrich skill development to provide a broad foundation in chemistry that stresses scientific reasoning and analytical problem solvingwith a molecular perspective.

Credits: **4**	Core Compulsory
Max. Marks: **100**	Min. Passing Marks: **40**

Total No. of Lectures =**60**

Unit	Topics	No. of Lectures
	Introduction to Indian ancient Chemistry and contribution of Indian Chemists, in context to the holistic development of modern science and technology, should be included under Continues Evaluation (CIE)	
I	**Molecular polarity and Weak Chemical Forces :** Resonance and resonance energy, formal charge, Van der Waals forces, ion-dipole forces, dipole- dipole interactions, induced dipole interaction, dipole moment and molecular Structure (Diatomic and polyatomic molecules), Percentage ionic character from dipole moment, polarizing power and polarizability. Fajan's rules and consequences of polarization. Hydrogen bonding, van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interaction. Effects of weak chemical forces, melting and boiling points, solubility, energetics of dissolution process. Lattice energy and Borrn-Haber cycle, solvation energy, and solubility of ionic solidsfor skilldevelopment and employability.	10
II	**Simple Bonding theories of Molecules** Atomic orbitals, Aufbau principle, multiple bonding (σ and π bond	10

	approach) and bond lengths, the valence bond theory (VBT), Concept of hybridization, hybrid orbitals and molecular geometry, Bent's rule, Valence shell electron pair repulsion theory (VSEPR), shapes of the following simple molecules and ions containing lone pairs and bond pairs of electrons: H_2O, NH_3, PCl_5, SF_6, SF_4, ClF_3, I_3^-, ClF_2^- and SO_4^{2-} and H_3O^+ . Molecular orbital theory (MOT). Molecular orbital diagrams Bondordersofhomonuclearandheteronucleardiatomicmoleculesandions(N_2,O_2,C_2,B_2,F_2,CO, NO, and theirions) for skilldevelopment and employability.	
III	**Periodic properties of Atoms (with reference to s & p-block)**: Briefdiscussion,factorsaffectingandvariationtrendsoffollowingpropertiesingroupsandperiods. Effective nuclear charge, shielding or screening effect, Slater rules, Atomic and ionic radii, Electronegativity, Pauling's/ Allred Rochow's scales, Ionization enthalpy, Electron gainenthalpyforskill development and employability.	05
IV	**Recapitulation of basics of Organic Chemistry:** Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bonding, Van der Waals interactions, inclusion compounds, Clatherates, Charge transfer complexes, hyperconjugation, Dipole moment; Electronic Displacements: Inductive, electromeric, resonance mesomeric effects and their applicationsforskilldevelopment and employability.	05
V	**Mechanism of Organic Reactions:** Curved arrow notation, drawing electron movements with allows, half-headed and double-headed arrows, homolytic and heterolytic bond fission, Types of reagents – electrophiles and nucleophiles, Types of organic reactions, Energy considerations. Reactiveintermediates– Carbocations,carbanions,freeradicals,carbenes,arynesandnitrenes(with examples). Assigning formal charges on intermediates and other ionic species. Methods of determinationofreactionmechanism(productanalysis,intermediates,isotopeeffects,kineticandstereo chemical studies) for skilldevelopment and employability.	10
VI	**Steriochemistry**-Concept of isomerism, Types of isomerism; Optical isomerism – elements of symmetry, molecular chirality, enantiomers, stereogeniccenter, optical activity, properties of enantiomers, chiral	10

	and achiral molecules with two stereogeniccenters, disasteromers,threo and erythrodiastereomers, meso compounds, resolution of enantionmer, inversion, retention and recemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism – determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational isomerism – conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives, Newman projection and Sawhorse formulae, Fischer and flying wedge formulae, Difference betweenconfiguration and conformationfor skill development and employability.	
VII	**BasicComputersystem(inbrief)-** HardwareandSoftware;Inputdevices,Storagedevices,Output devices,CentralProcessingUnit(ControlUnitandArithmeticLogicUnit); Numbersystem(Binary, Octal and Hexadecimal Operating System); Computer Codes (BCD and ASCII)**;** Numeric/String constants and variables. Operating Systems (DOS, WINDOWS, and Linux); Software languages: LowlevelandHighLevellanguages(Machinelanguage,Assemblylanguage;QBASIC,FORTRAN and C++); Software Products (Office, chemsketch, scilab, matlab, hyperchem, etc.),internetapplicationfor skilldevelopment and employability.	05
VIII	**Mathematical Concepts for Chemistry** Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of functions like Kx, e^x, X^n , sin x, log x; maxima and minima, partial differentiation and reciprocity relations, Integration of some useful/relevant functions; permutations and combinations, Factorials, Probabilityfor skilldevelopment and employability.	05

Course outcomes:

CO1: Molecular geometries , physical and chemical properties of themoleculesfor skill development and employability.

CO2: Current bonding models for simple inorganic and organic molecules in order to predict structures and important bondingparametersforskilldevelopment and employability.

CO3: The chapter Recapitulation of basics of organic chemistry gives the most primary and

utmostimportant knowledge and concepts of organicChemistryforskilldevelopment and employability.

CO4: This course gives a broader theoretical picture in multiple stages in an overall chemical reactionfor skilldevelopment and employability.

CO5: It describes reactive intermediates , transition states and states of all the bonds broken and formedfor skilldevelopment and employability.

CO6: It enables tounderstand the reactants, catalyst ,steriochemistry and major and minor products of any organicreaction for skilldevelopment and employability.

CO7: It describes the types of reactions and the Kinetic and thermodynamic aspects one should know for carrying out any reaction and the ways how the reaction mechanism can bedeterminedfor skilldevelopment and employability.
CO8: The chapters Steriochemistry gives the clear picture of two-dimensional and three-dimensional structure ofthe molecules, and their role in reactionmechanism
Skill development.

CO/PO Mapping Course: Outcomes leading to the achievement of Programme Outcomes: (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO 1	2	1	2	1	1	2	2	1
CO 2	2	2	2	2	1	1	1	2
CO 3	1	1	1	2	1	2	2	1
CO 4	1	1	2	1	1	1	1	1
CO 5	1	2	1	1	2	2	2	1
CO 6	1	1	1	2	1	1	2	2
CO 7	1	1	1	1	2	1	2	2
CO 8	1	1	1	2	1	1	2	1

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
CO6	3	2	1
CO7	3	2	1
CO8	3	2	1

Sugggestion Books :

1. Lee, J.D. Concise Inorganic Chemistry, Pearson Education2010
2. Huheey, J.E., Keiter, E.A., Keiter, R. L., Medhi, O.K. Inorganic Chemistry, Principles of StructureandReactivity,Pearson Education 2006.
3. Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry, Oxford,1970
4. Shriver, D.D. & P. Atkins, *Inorganic Chemistry 2nd Ed.*, Oxford University Press,1994.
5. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications1962.
6. Singh J.,YadavL.D.S.,Advanced Organic Chemistry,PragatiEdition
7. Carey, F. A., Guiliano, R. M.*Organic Chemistry*, Eighth edition, McGraw Hill Education,2012.
8. Loudon, G. M. *Organic Chemistry*, Fourth edition, Oxford University Press,2008.
9. Clayden,J.,Greeves,N.&Warren,S.*OrganicChemistry*,2nd edition,OxfordUniversityPress,2012.
10. Graham Solomons, T.W., Fryhle, C. B. *Organic Chemistry*, John Wiley &Sons,Inc.
11. Sykes, P. *A guidebook to Mechanism in Organic Chemistry*, Pearson Education,2003

Note: For the promotion of Hindi language, course books published in Hindi may be prescribed by the University

Suggested online links:

http://heecontent.upsdc.gov.in/Home.aspx
https://nptel.ac.in/courses/104/106/104106096/http://heecontent.upsdc.gov.in/Home.aspxhttps://nptel.ac.in/courses/104/106/104106096/https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htmhttps://nptel.ac.in/courses/104/103/104103071/#

This course is compulsory for the students of following subjects: Chemistry in 12th Class

Suggested Continuous Evaluation Methods: Students can be evaluated on the basis of score obtained in a mid-term exam, together with the performance of other activities which can include short exams, in-class or on-line tests, home assignments, group discussions or oral presentations, among others .

Course prerequisites: To study this course, student must have had the chemistry in class 12 th

Suggested equivalent online courses:

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B.Sc.-B.Ed. (Integrated Teacher Education) Programme

Course II

(Practical)

Programme: Chemistry	Year: **First**	Semester: **I**
Subject: **Chemistry**		
Course Code: **B020102P**	**Course Title: Quantitative Analysis**	

Objectives: The objective of this course is to develop skills about the chemical experiments, properlycarrying out of the experiments, and appropriately record and analyze the results. Students will be able touse standard laboratory equipment, modern instrumentation, and classical techniques to carry outexperiments. Students will know and follow the proper procedures and regulations for safe handling anduse of chemicals for skilldevelopment and employability.

Credits: **2**	Elective
Max. Marks: 25+75 = 100	Min. Passing Marks:40

Practical **60h**

Unit	Topics	No of Lectures
I	**Water Quality analysis** 1. Estimation of hardness of water byEDTA. 2. Determination of chemical oxygen demand(COD). Determination of Biological oxygen demand(BOD) to developskill and employability.	**16**
II	**Estimation of Metals ions** 1. Estimation of ferrous and ferric by dichromatemethod. 2. Estimation of copper usingthiosulphateskilldevelopment and employability.	**14**
II	**Estimation of acids and alkali contents** 1. Determination of acetic acid in commercial vinegar usingNaOH. 2. Determination of alkali content – antacid tablet usingHCl. Estimation of oxalic acid by titrating it withKMnO4 forskilldevelopment and employability.	**14**

IV	**Estimation of inorganic salts and hydrated water** 1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. 2. Estimation of calcium content in chalk as calcium oxalate bypermanganometry. Estimation of water of crystallization in Mohr's salt by titrating withKMnO4skill development and employability.	**16**
	Course outcomes: CO1: Potability tests of water samples of water samples skill development and employability. CO2: Eestimation of metalsionsfor skill development and employability. CO3: Estimation of acids and alkali contents in commercial productsskilldevelopment and employability. CO4: Estimation of in organic salt sandhydrated water in samples for skill development and employability.	

CO/PO Mapping Course: Outcomes leading to the achievement of Programme Outcomes:(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	2	1	1	2	1	1	1
CO2	1	1	1	1	2	1	1	1
CO3	1	1	1	1	1	1	1	1
CO4	1	2	1	1	1	1	1	1

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

Suggested Readings:

1. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson,2009.
2. Harris, D. C. Quantitative Chemical Analysis. 6th Ed., Freeman (2007) Chapters3-5.
3. Harris, D.C.*Exploring Chemical Analysis*, 9th Ed. New York, W.H. Freeman,2016.
4. Khopkar, S.M. *Basic Concepts of Analytical Chemistry*. New Age International Publisher,2009.
5. Skoog, D.A. Holler F.J. and Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning India Edition

Note: For the promotion of Hindi language, course books published in Hindi may be prescribed by the University

Suggestive digital platforms web links

6. https://www.labster.com/chemistry-virtual-labs/
7. https://www.vlab.co.in/broad-area-chemical-sciences
8. **http://chemcollective.org/vlabs**

Course prerequisites: To study this course, a student must have had the chemistry in 12th Class

Suggested equivalent online courses:
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Further Suggestions:
……..

B.Sc.-B.Ed. (Integrated Teacher Education)
Programme
Course I
(Practical)

Programme/Class: **Certificate/ BSc BEd**	Year: **First**	Semester: **First**
Subject: **Mathematics**		
CourseCode:**B030101T**	CourseTitle:**DifferentialCalculus&IntegralCalculus**	

Objective: The main aim of this course is to provide entrepreneurial skills to the student with necessary analytic andtechnical skills to handle problems of mathematical nature as well as practical problems. More precisely, main target ofthis course is to explore the different tools for higher order derivatives, to plot the various curves and to solve the problemsassociated with differentiation and integration of vector functions. This course is primarily concerned with developing experimental skills in the students and understanding of the concepts of calculus and providing experience with its methodsand applications to create mathematical models in order to arrive into an optimal solution.

Credits: **4**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**

TotalNo.ofLectures-Tutorials-Practical(inhoursperweek):L-T-P:4-0-0

Unit	Topics	No. of Lectures
I	**IndianAncientMathematicsandMathematicians** Definition of a sequence, theorems on limits of sequences, bounded and monotonic sequences, Cauchy's convergence criterion, Cauchysequence, limit superior and limit inferior of a sequence, subsequence, Series of non-negative terms, convergence and divergence,Comparisontests,Cauchy'sintegraltest,Ratiotests,Roottest,Raabe'slogarithmictest,deMorganandBertrand'stests,alternating series,Leibnitz'stheorem,absoluteandconditionalconvergenceskilldevelopment and employability.	**9**
II	Limit,continuityanddifferentiabilityoffunctionofsinglevariable,Cauchy'sdefinition,Heine'sdefinition,equivalenceofdefinitionofCauchyandHeine,Uniformcontinuity,Borel'stheorem,boundednesstheorem,Bolzano'stheorem,Intermediatevaluetheorem,extremeevaluetheorem,Darboux'sintermediatevaluetheoremforderivatives,Chainrule,indeterminateformsskill development and employability.	**7**
III	Rolle'stheorem,LagrangeandCauchyMeanvaluetheorems,meanvaluetheoremsofhigherorder,Taylor'stheoremwithvariousformsofremainders,Successivedifferentiation,Leibnitztheorem,Maclaurin'sandTaylor'sseries, Partial differentiation,Euler's theore Amonhomogeneous function	**7**
IV	Tangentandnormals,Asymptotes,Curvature,Envelopsandevolutes,Testsforconcavityand convexity,Pointsofinflexion,Multiplepoints,Parametricrepresentationofcurvesandtracing ofparametriccurves,TracingofcurvesinCartesianandPolarforms	**7**

	Part-B IntegralCalculus	
V	Definiteintegralsaslimitofthesum,Riemannintegral,Integrabilityofcontinuousandmonotonicfunctions,Fundamentaltheoremof Integralcalculus,Meanvaluetheoremsofintegralcalculus,DifferentiationunderthesignofIntegrationskill development and employability.	**9**
VI	Improperintegrals,theirclassificationandconvergence,Comparisontest,μ-test,Abel'stest,Dirichlet'stest,quotienttest,Betaand Gammafunctionsskill development and employability.	**7**
VII	Rectification,VolumesandSurfacesofSolidofrevolution,Pappustheorem,Multipleintegrals,changeoforderofdoubleintegration,Dirichlet'stheorem,Liouville'stheoremformultiple Integralsskill development and employability.	**7**
VIII	VectorDifferentiation,Gradient,DivergenceandCurl,Normalonasurface,DirectionalDerivative,VectorIntegration,Theoremsof Gauss,Green,Stokesandrelatedproblemsskill development and employability.	

Course Learning outcomes:

CO1 : To enhance knowledge of real valued functions such as sequence and series.They will also be able to know about continuous and differentiable functionsskill development and employability.

CO2: They should have knowledge about curvature, envelope and evolutes and trace curve in polar, Cartesian as well as parametric curves and many other related conceptsskill development and employability.

CO3 : The course is to equip the student with necessary analytic and technical skills. By applying the principles of integral he learns to solve a variety of practical problems in science and engineeringskill development and employability.

CO4 : To get the knowledge of beta gamma function and different theorems regarding vector integration skill development and employability.

CO5 **:** To increase the knowledge of students regarding many engineering problemsskill development and employability.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs):
(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	1	1	1	2	2	2	1
CO2	2	1	2	1	2	1	1	1
CO3	2	2	1	2	1	1	2	1
CO4	2	1	2	1	2	2	1	1
CO5	1	1	2	1	1	1	1	2

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1

Suggested Readings:

1. R.G.Bartle&D.R.Sherbert,IntroductiontoRealAnalysis,JohnWiley&Sons
2. T.M.Apostal,CalculusVol.I,JohnWiley&SonsInc.
3. S.BalachandraRao&C.K.Shantha,DifferentialCalculus,NewAgePublication.
4. H.Anton,I.BirensandS.Davis,Calculus,JohnWileyandSons,Inc.,2002.
5. G.B.ThomasandR.L.Finney,Calculus,PearsonEducation,2007.
6. Suggestivedigitalplatformsweblinks:NPTEL/SWAYAM/MOOCS
7. CourseBooks (text/reference) publishedinHindimaybeprescribedbytheUniversities.

SuggestedReadings(Part-BIntegralCalculus):

1. T.M.Apostal,CalculusVol.II,John WileyPublication
2. ShantiNarayan&Dr.P.K.Mittal,IntegralCalculus,S.Chand
3. ErwinKreyszig,AdvancedEngineeringMathematics,JohnWiley&Sons.
4. Suggestivedigitalplatformsweblinks:NPTEL/SWAYAM/MOOCS
   1. CourseBooks (text/reference)publishedinHindimaybeprescribedbythe respectiveuniversitiesatlocallevel.

Thiscoursecanbeoptedasanelectivebythestudentsoffollowingsubjects: Engg.andTech.(UG),Chemistry/Biochemistry/LifeSciences(UG), Economics(UG/PG),Commerce(UG),BBA/BCA, B.Sc.(C.S.)

SuggestedContinuousEvaluationMethods: Max.Marks:25

B.Sc.-B.Ed. (Integrated Teacher Education)

Programme
Course II
(Practical)

Programme/Class: **Certificate**/	Year: **First**	Semester: **First**
Subject: **Mathematics**		
Course Code: **B030102P**	Course Title: **Practical**	
Credits: **2**	Core Compulsory	
Max. Marks: **25+75**	Min. Passing Marks: **40**	
Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-2**		

Unit	**Topics**	**No. of Lectures**
I	**Practical /LabworktobeperformedinComputer Lab.** ListofthepracticalstobedoneusingR/Python/Mathematica/MATLAB/Maple/ Scilab/Maximaetc. 1.Plottingthegraphsofthefollowingfunctions: (i) ax (ii) [x](greatestintegerfunction) (iii) x^{2n};n∈N (iv) x^{2n-1};n∈N (v) $\frac{1}{x^{2n-1}}$;n∈N (vi) $\frac{1}{x^{2n}}$;n∈N (vii) √ax+b,|ax+b|,c±|ax+ b| (ix) |x|,sin(),xsin(),e^{x},e^{-x}forx≠0. $\frac{1}{x}$ $\frac{1}{x}$ $\frac{1}{x}$ (x) e^{ax+b},log(ax+b), $\frac{1}{ax+b}$,sin(ax+b),cos(ax+b),|sin(ax+b)|,|cos(ax+b)|. Observeanddiscusstheeffectofchangesintherealconstantsa	**12**

	andbonthegraphs. (2) Byplottingthegraphfindthe solutionoftheequation $x=e^x, x^2+1=e^x, 1-x^2=e^x, x=\log_{10}(x), \cos(x)=x, \sin(x)=x, \cos(y)=\cos(x), \sin(y)=\sin(x)$etc (3) Plottingthegraphsofpolynomialofdegree 2,3,4and5,andtheirfirstandsecond derivatives. (4)Sketchingparametriccurves,e.g.,Trochoid,Cycloid,EpicycloidandHypocycloidetc. (5)Tracingof conic inCartesiancoordinates. (6) Graphofcircularandhyperbolicfunctions. (7) Obtainingsurfaceofrevolutionofcurves. (8) Complex numbers and their representations, Operations like addition, Multiplication, Division, Modulus. Graphical representationofpolar form. (9) Findnumbersbetweentworealnumbersandplottingoffiniteandinfinitesubsetof R. (10) MatrixOperations:Addition,Multiplication,Inverse,Transpose,Determinant,Rank,Eigenvectors,Eigenvalues,Characteristicequation and verificationoftheCayley-Hamiltontheorem,Solvingthe systems oflinear equations. (11) Studytheconvergenceofsequencesthroughplotting. (12) VerifyBolzano-Weierstrasstheoremthroughplottingofsequencesandhenceidentifyconvergentsubsequencesfromtheplot. (13) Studythe convergence/divergenceofinfiniteseriesbyplottingtheirsequencesofpartialsum. (14) Cauchy'srootstestbyplotting n-throots. Ratio testbyplotting theratioof$n$-thand $(n+1)$-thtermskill development and employability.	

Course outcomes:

CO1: The main objective of the course is to equip the student to plot the different graph and solve the different type of equations by plotting the graph using different computer software such as Mathematica /MATLAB /Maple /Scilab / Maxima etcskill development and employability.

CO2: After completion of this course student would be able to know the convergence of sequences through plotting, verify Bolzano-Weierstrass the orem through plotting the sequence, Cauchy's root test by plotting n^{th} roots and Ratio test by plotting the ratio of n^{th} and $(n+1)^{th}$ term for skill development and employability.

CO3: Student would be able to plot Complex numbers and their representations, Operations like addition, subtraction, Multiplication, Division, Modulus and Graphical representation of polar formskill development and employability.

CO4: Student would be able to perform following task of matrix as Addition, Multiplication, Inverse, Transpose, Determinant, Rank, and Eigen vectors, Eigen values, Characteristic equation and verification of the Cayley-Hamilton theorem, solving the systems offline are equationsskill

development.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs):(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	2	2	2	1	1	1
CO2	2	2	2	1	2	2	2	1
CO3	2	1	1	2	1	2	1	2
CO4	1	1	2	1	1	2	1	1

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

Suggested Readings:

Thiscoursecanbeoptedasanelectivebythestudentsoffollowingsubjects: Engg.AndTech.(UG),Chemistry/Biochemistry/LifeSciences(UG),
Economics(UG/PG),Commerce(UG),BBA/BCA,B.Sc.(C.S.)

B.Sc.-B.Ed. (Integrated Teacher Education)

Programme
Course I
(Theory)

Programme/Class: **Certificate/ BSc BEd**	Year: **First**	Semester: **First**
Subject: **Botany**		
Course Code: **B040101T**	Course Title: **Microbiology & Plant Pathology**	
Objective: The objective of this course to enhance the knowledge of the students about viruses, bacteria and fungi, their classification, structure, growth and their economic importance skill development.		
Credits: **4**	Core Compulsory	
Max. Marks: **25+75**	Min. Passing Marks:40	
Total No. of Lectures-Tutorials-Practical (in hours per week): **4-0-0**		

Unit	Topics	No. of Lectures
	Part I	
I	**A.** Introduction to Indian ancient ,Vedic and heritage Botany and contribution of Indian Botanists, in context with the holistic development of modern science and technology, has to be taught, practiced and assessed via class interaction/ assignments / self study mentioned under Continuous Internal Evaluation(CIE). **B. Microbial Techniques &instrumentation** Microscopy – Light, phase contrast, electron, scanning and transmission electron microscopy, staining techniques for light microscopy, sample preparation for electron microscopy. Common equipments of microbiology lab and principle of their working – autoclave, oven, laminar airflow, centrifuge. Colorimetry and spectrophotometry, immobilization methods, fermentation and fermenters skill development and employability.	**8**
II	**Microbial world** Cell structure of Eukaryotic and prokaryotic cells, Gram positive and Gram negative bacteria, Structure of a bacteria; Bacterial Chemotaxis and Quorum sensing, Bacterial Growth curve, factors affecting growth of microbes; measurement of growth; Batch culture, fed batch culture and continuous culture; Synchronous growth of microbes; Sporulation and reproduction and recombination in bacteria; Viruses, general characteristics, viral culture, Structure of viruses, Bacteriophages, Structure of T4 &, λ-phage; Lytic and Lysogenic cycles, viroids, Prions &myco& phytoplasma,	**8**

	Actinomycetes & plasmids and their economic usesskill development and employability.	
III	**Phycology** Range of thallus organization in Algae, Pigments , Reserve food – Reproduction - Classification and life cycle of – *Nostoc; Chlorella, Volvox, Oedogonium , Chara; Sargassum , Ectocarpus, Polysiphonia* . Economic importance of algae - Role of algae in soil fertility-biofertilizer – Nitrogen fixation- Symbiosis ;Commercial products of algae –biofuel, Agarskill development and employability.	**7**
	Part II	
IV	**Mycology** General characteristics, nutrition, life cycle, Economic importance of Fungi, Classification upto class. Distinguishing characters of Myxomycotina -General characters. Zygomycotina– *Rhizopus,* Ascomycotina -*Saccharomyces, Penicillium, Peziza* , Basidiomycotina-*Ustilago, Puccinia, Agaricus;* Deuteromycotina – *Fusarium, Alternaria*, Heterothallism, Physiological specialization, Heterokaryosis &Parasexualityskill development and employability.	**7**
V	**Mushroom Cultivation, Lichenology &Mycorrihza** Mushroom cultivation. General account of lichens, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significanceskill development,entrepreneurship and employability.	**7**
VI	**Plant Pathology** Disease concept, Symptoms, Etiology & causal complex, Primary and secondary inoculum, Infection, Pathogenicity and pathogenesis, Koch's Postulates. Mechanism of infection (Brief idea about Pre-penetration, Penetration and Post-penetration), Disease cycle (monocyclic, polycyclic and polyetic). Defense mechanism with special reference to Phytoalexin, Resistance- Systemic acquired and Induced systemic. fungicides- Bordeaux mixture, Lime sulphur, Tobacco decoction,Neem cake & oil	**7**
VII	**Diseases and Control** Symptoms , Causal organism, Disease cycle and Control measures of – Early & Late blight of Potato, Brown spot of rice, Black stem rust of wheat, Stem rot of Mustard , Red rot of Sugarcane, Wilting of Arhar, mosaic diseases on tobacco and cucumber, yellow vein mosaic of bhindi; citrus canker, little leaf of brinjal; damping off of seedlings, Disease management: - Quarantine, Chemical, Biological, Integrated pest disease managementskill development,entrepreneurship and employability.	**8**
VIII	**Applied Microbiology** Food fermentations and food produced by microbes, amino acids, Production of antibiotics, enzymes, vitamins, alcoholic beverages, organic acid & genetic recombinant vaccines. Mass production of	**8**

	bacterial biofertilizers, blue green algae, Azolla and mycorrhiza. Plant growth promoting rhizobacteria & biopesticides—Trichoderma sp. and Pseudomonas, Single cell proteins, Organic framing inputs, Microbiology of water, Bioploymers, Bioindicators, biosensors, Bioremediation, Production of biofuels, biodegradation of pollutants andbiodeterioration of materials& Cultural skill development,entrepreneurship and employability.	

Course outcomes:

CO1: Develop understanding about the classification and diversity of different microbes including viruses, Algae, Fungi & Lichens & their economic importance to develop skill development and employability.

CO2: Develop conceptual skill about identifying microbes, pathogens, biofertilizers for developing skill andemployability.

CO3: Gain knowledge about developing commercial enterprise of microbial productsfor developing skill and employability.

CO4: Learn host –pathogen relationship and disease management for developing skill and employability.

CO5: Learn Presentation skills (oral & writing) in life sciences by usage of computer of computer & multimedia for developing skill and employability.

CO6: Gain Knowledge about uses of microbes in various fieldsfor developing skill and employability.

CO7: Understand the structure and reproduction of certain selected bacteria algae, fungi and lichensfor developing skill and employability.

CO8: Gain Knowledge about the economic values of this lower group of plant communityfor developing skill and employability.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	1	1	1	2	1	2
CO2	2	2	1	2	2	2	2	2
CO3	1	1	2	2	2	1	1	1
CO4	2	1	1	1	1	1	1	2
CO5	2	1	1	2	2	1	1	1

CO6	1	1	1	2	2	2	2	1
CO7	1	2	1	2	1	1	1	2
CO8	2	1	1	2	2	1	2	1

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
CO6	3	2	1
CO7	3	2	1
CO8	3	2	1

Suggested Readings:

1. Modern Microbiology (hindi) (hb) ISBN : 9788177543599Edition : 1Year : 2018Author : Dr.Purohit SS , Dr. Singh T Publisher : Agrobios (India).
2. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2ndedition.
3. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
4. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd.,Delhi.
5. Aggarwal, S. K. 2009. Foundation Course in Biology, A one books Pvt. Ltd., NewDelhi.
6. Aneja, K. R. 1993. Experiments in Microbiology, Pathology and Tissue Culture, Vishwa Prakashan,NewDelhi.
7. Annie Ragland, 2012. Algae and Bryophytes, Saras Publication, Kanyakumari,India.
8. Basu, A. N. 1993. Essentials of Plant Viruses, Vectors and Plant diseases, New Age International, NewDelhi.
9. Chopra. G. L. 1984. A text book of Algae, Rastogi publications,Meerut,India.
10. Desikachari, T. V. 1959. Cyanophyta, ICAR, NewDelhi.
11. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd.,NewDelhi.
12. Fritsch, R. E. 1977. Structure and Reproduction of Algae, Cambridge University Press,London.
13. Kodo, C.I. and Agarwal, H.O.1972. Principles and techniques in Plant Virology, Van Nostrand, Reinhold Company, New York.
14. Agrios, G.N. (1997). Plant Pathology, 4th edition. Cambridge, U.K.: AcademicPress.
15. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, 4th

edition. Singapore, Singapore: John Wiley &Sons.
16. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies. Noida, U.P.: Macmillan Publishers IndiaLtd.
17. Reven, F.H., Evert, R. F., Eichhorn, S.E. (1992). Biology of Plants. New York, NY: W.H. Freeman andCompany.
18. Sharma, P.D. (2011). Plant Pathology. Meerut, U.P.: RastogiPublication.
19. Webster, J., Weber, R. (2007). Introduction to Fungi, 3rd edition. Cambridge, U.K.: Cambridge UniversityPress..
20. Pandey B.P. 2001. College Botany Volume 1, S Chand & Company Pvt.Ltd, NewDelhi.
21. Pandey. B.P. 2014 Modern Practical Botany, (Vol-I) S. Chand and Company Pvt. Ltd., NewDelhi.
22. Pelzar, 1963. Microbiology, Tata Mc Graw Hill, NewDelhi
23. Rangaswamy, G. 2009, Disease of Crop Plants in India, Prientice Hall of India, NewDelhi.
24. Sambamurty. A.V.S.S. 2006, A Text book of Algae, I. K. International Publishing House, Pvt. Ltd., NewDelhi.
25. Sharma, P. D. 2012, Microbiology and Plant Pathology, Rastogi Publication Pvt Ltd., Meerut,India.
26. Singh, R. P. 2007. Microbial Taxonomy and Culture Techniques, Kalyani Publication, NewDelhi.
27. Smith. G. M. 1996. Cryptogamic Botany Volume I, Tata Mc Graw Hill, NewDelhi.
28. Sundar Rajan. S. 2010.College Botany Volume I, Himalaya Publications,Mumbai.
29. Vashishta, B.R. Sinha, A.K. and Singh, V. P. 1991. Algae, S. Chand and Company, Pvt. Ltd., NewDelhi

This course can be opted as an elective by the students of following subjects: Open to all but special forB.Sc. Biotech, B.Sc. Microbiology, B.Sc. Agriculture, B.A. (Curators), B.A. Archaeology, B.A. Geology, BAMS.

Course prerequisites:

Qualification: To study this course, a student must have qualified 10+2 with Biology/ NSQF level 3 from Sector Skill Councils / Diploma holder from ITI in (Biology/ Agriculture/ Biotech/ Forestry/ Microbiology/Gardening /biomedicalScience.

Facilities: Smart and Interactive Class

Other Requisites: Video collection, Books, CDs, Access to On-line resources, Display Charts

Suggested equivalent online courses:

https://indianculture.gov.in/rarebooks/economic-botany-indiahttps://community.plantae.org/tags/mooc futurelearn.com/courses/teaching-biology-inspiring-students-with-plants-in-sciencehttps://www.coursera.org/courses?query=plantshttp://egyankosh.ac.in/handle/123456789/53530https://www.classcentral.com/tag/microbiologyhttps://www.edx.org/learn/microbiology https://www.mooc-list.com/tags/microbiologyhttps://www.udemy.com/topic/microbiology/https://ucmp.berkeley.edu/bacteria/bacteria.htmlhttps://www.livescience.com/53272-what-is-a-virus.htmlhttps://gclambathach.in/lms/Economic%20importance%20of%20Algae.pdfhttps://www.slideshare.net/sardar1109/algae-notes-1https://www.onlinebiologynotes.com/algae-general-characteristics-classification/https://www.sciencedirect.com/topics/immunology-and-microbiology/fungushttps://ucmp.berkeley.edu/fungi/fungi.html https://agrimoon.com/wp-content/uploads/Mashroom-culture.pdfhttp://ecoursesonline.iasri.res.in/mod/page/view.php?id=11293htt

p://www.hillagric.ac.in/edu/coa/ppath/lect/plpath111/Lect.%201%20%20Introduction-Pl%20Path%20111.pdfhttp://www.jnkvv.org/PDF/11042020102651plant_pathology.pdf https://www.apsnet.org/edcenter/disimpactmngmnt/topc/EpidemiologyTemporal/Pages/ManagementStrategies.aspx https://learn.saylor.org/course/view.php?id=23&sectionid=6821https://www.sciencedirect.com/topics/earth-and-planetary-sciences/microscopyhttp://physics.fe.uni-lj.si/students/predavanja/Microscopy_Kulkarni.pdfhttps://lipidnanostructuresgroup.weebly.com/https://zoology4civilservices.wordpress.com/2016/06/18/65/https://microbenotes.com/laminar-flow-hood/

B.Sc.-B.Ed. (Integrated Teacher Education) Programme

Course II

(Practical)

Programme/Class: **Certificate/**	Year: **First**	Semester: **First**
Subject: **Botany**		
Course Code: **B040102P**	Course Title: **Techniques in Microbiology &Plant Pathology**	

Objective: The course aims to share the knowledge to the students about the experiments. The students will get a better understanding of the concept studied by them in theory course and correlate with experimental observations for developing skil, entreprenrurship and employability.

Credits: **2**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: 40

Total No. of Lectures-Tutorials-Practical (in hours per week): L- **2/w**

Unit	Topics **Topic * (Minimum Any three from each unit depending on facilities)**	No. of Lectures
I	INSTRUMENTS & TECHNIQUES 1. Laboratory safety and good laboratorypractices 2. Principles and application of Laboratory instruments-microscope, incubator, autoclave, centrifuge, LAF, filtration unit, shaker, pH meter. 3. Buffer preparation &titration 4. Cleaning and Sterilization ofglasswares 5. Preparation of media- Nutrient Agar andBroth 6. Inoculation and culturing of bacteria in Nutrient agar and nutrientbroth 7. Preparation of agar slant, stab, agar plate Phenol Coefficient method to test the efficacy ofdisinfectants for developing skill and employability.	7
II	BACTERIAL IDENTIFICATION 1. Isolation ofbacteria. 2. Identification ofbacteria. 3. Staining techniques: Gram's, Negative, Endospore, Capsule and CellWall. 4. Cultural characteristics of bacteria onNA. 5. Pure culture techniques (Types ofstreaking). 6. Biochemical characterization: IMViC, Carbohydrate fermentation test, Mannitol motility test, Gelatin liquefaction test, Urease test, Nitrate reduction test, Catalase test, Oxidase test, Starch hydrolysis, Casein hydrolysisfor developing skill and employability.	8

III	MYCOLOGICAL STUDY: 1. Isolation of different fungi: Saprophytic, Coprophilous,Keratinophilic. *2.* Identification of fungi by lactophenol cotton blue method. *Rhizopus Saccharomyces, Penicillium, Peziza ,Ustilago, Puccinia;Fusarium,Curvularia, Alternaria.* 3. *Agaricus*: Specimens of button stage and full grown mushroom; Sectioning ofgillsof*Agaricus*. Lichens: crustose, foliose and fruticosespecimens for developing skill and employability.	8
IV	PHYCOLOGY: 1. Type study of algae and Cyanobacteria –*Spirullina, Nostoc*. Chlorophyceae - *Chlorella*, *Volvox*, *Oedogonium, Cladophora,*and*Chara;* Xanthophyceae – *Vaucheria ;*Bacillariophyceae – *Pinnularia*Phaeophyceae – *Sargassum R*hodophyceae - *Polysiphonia*	7
V	EXPERIMENTAL PLANT PATHOLOGY 1. Preparation of fungal media (PDA) &Sterilizationprocess. 2. Isolation of pathogen from diseasedleaf. Identification: Pathological specimens of Brown spot of rice, Bacterial blight of rice, Loose smut of wheat, Stem rot of mustard, Late blight of potato; Slides of uredial, telial, pycnial& aecial stages of Puccinia,Few viral and bacterial plant diseases for developing skill and employability.	8
VI	PRACTICALS IN APPLIED MICROBIOLOGY-1 1. Isolation of nitrogen fixing bacteria from root nodules oflegumes. 2. Enumeration of rhizosphere to non rhizosphere population ofbacteria. 3. Isolation of antagonistic Pseudomonas fromsoil. 4. Microscopic observations of root colonization by VAMfungi. 5. Isolation of Azospirillum sp. from the roots ofgrasses. **6.** Isolation of phyllospheremicroflora. Isolation of P solubilizingmicroorganism for developing skill and employability.	8
VII	PRACTICALS IN APPLIED MICROBIOLOGY-2 1. Wineproduction. 2. Isolation of lactic acid bacteria fromcurd. 3. Isolation of lipolytic organisms from butter orcheese. 4. Immobilized bacterial cells for production of hydrolyticenzymes. 5. Enzyme production and assay – cellulase, protease andamylase. 6. Immobilization ofyeast. 7. Isolation of cellulolytic and anaerobic sulphate reducingbacteria. Isolation and characterization of acidophilic, alkalophilic and halophilicbacteria for developing skill and employability.	8
VIII	1. Cultivation of Spirulina, & Chlorella in lab forbiofuel 2. Visit to NBAIM,Mau,Varanasi(Kashi)/IMT,Chandigarh for viewing Culture Repository 3. Visit to biofertilizers and biopesticides unit to understand about the Unitoperation procedures	6

	4. Mushroom cultivation forProtein Alcohol production. from SugarcaneJuice for developing skill and employability.	

Course outcomes:

Students will be able to understand

CO1: Understand the instruments, technique, lab etiquettes and good lab practices for working in a microbiology laboratory for developing skill and employability.

CO2: Develop skills for identifying microbes and using them for Industrial, Agriculture and Environment purposes for developing skill and employability

CO3: Practical skills in the field and laboratory experiments in Microbiology & Pathology.

CO4: Learn to identify Algae, Lichens and plant pathogens along with their Symbiotic and Parasitic associations.

CO5: Have the knowledge of Gram staining techniquefor developing skill and employability.

CO6: Gain knowledge on fixation, dehydration, hand sectioning, microtome sectioning.

CO7: Observe and identify the microbes, algae and fungi for developingemployability

CO8: Can initiate his own Plant & Seed Diagnostic Clinic Can start own enterprise on microbial productfor for developing skill and employability

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	3	1	2	1	1	2
CO2	1	1	2	1	1	2	2	2
CO3	2	1	1	2	2	2	1	2
CO4	1	1	1	2	1	1	2	2
CO5	2	2	2	1	2	1	2	2
CO6	1	1	1	1	1	1	1	2
CO7	2	2	1	1	2	2	2	2
CO8	1	1	2	1	1	2	1	2

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1

CO2	3	2	1
CO3	3	1	1
CO4	3	2	1
CO5	3	1	1
CO6	2	2	1
CO7	3	1	1
CO8	3	2	1

Suggested Readings:

1. Practical Botany (Part I) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda& Anamika Singhvi Edition:2013 Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual)
2. Modern Mushroom Cultivation And Recipes (hindi) (hb)ISBN : 9788177545180Edition : 01Year : 2017Author : Singh Riti , Singh UCPublisher : Agrobios(India)
3. Biofertilizer Production Manual (hindi) (hb) ISBN : 9788177541274Edition : 01Year : 2014Author : Gehlot D Publisher : Agrobios (India)Language :Hindi
4. Aneja, K. R. 1993. Experiments in Microbiology, Pathology and Tissue Culture, Vishwa Prakashan, New Delhi.
5. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., New Delhi.
6. Kodo, C.I. and Agarwal, H.O.1972. Principles and techniques in Plant Virology, Van Nostrand, Reinhold Company, NewYork.
7. MadhaveeLatha, P. 2012, A Textbook of Immunology, S. Chand & Company Pvt. Ltd., NewDelhi.
8. Pandey. B.P. 2014 Modern Practical Botany, (Vol-I) S. Chand and Company Pvt. Ltd., NewDelhi.
9. Sambamurty. A.V.S.S. 2006, A Text book of Algae, I. K. International Publishing House, Pvt.Ltd.,
10. Singh, R. P. 2007. Microbial Taxonomy and Culture Techniques, Kalyani Publication, NewDelhi.
11. https://agrimoon.com/wp-content/uploads/Mashroom-culture.pdf
12. http://nhb.gov.in/pdf/Cultivation.pdf
13. https://www.k-state.edu/fungi/Greeting/Publications_files/2006%20Handbook.pdf
14. Sen, Surjit,Acharya, Krishnendu, Rai, Manjula 2019 IBSN - 978-93-88347-23-5 - Biofertilizers and Biopesticides.Technoworld,kolkatta
15. http://www.kvkkendrapara.org/pdf/Bio%20Fertilizer%20Production%20and%20marketing.pdf
16. http://www.gbv.de/dms/tib-ub-hannover/751302945.pdf
17. Hochman,Gal,Zilberman,David 2014 IBSN-1461493285-Algae Farming and Its Bio-ProductsSpringer
18. Gokare A. Ravishankar , Ranga Rao Ambati 2019 Handbook of Algal Technologies and Phytochemicals Volume II: Phycoremediation, Biofuels and Global Biomass Production Print ISBN:9780367178192
19. Amos Richmond Ph.D., Prof. Emeritus, Qiang Hu Ph.D 2013. Handbook of

Microalgal Culture: Applied Phycology and Biotechnology, Second Edition PrintISBN:9780470673898

This course can be opted as an elective by the students of following subjects: Open to all but special for

B.Sc. Biotech, B.Sc. Microbiology, B.Sc. Agriculture, B.A. (Curators), B.A. Archaeology, B.A. Geology, BAMS.

Course prerequisites:

Qualification: To study this course, a student must have qualified 10+2 with Biology/ NSQF level 3 from Sector Skill Councils / Diploma holder from ITI in (Biology/ Agriculture/ Biotech/ Microbiology/biomedical Science.

Facilities: Smart and Interactive Class

1st Year, Semester-I
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class: **Certificate**/	Year: **First**	Semester: **First**
Subject: **Zoology**		
Course Code: **B050101T**	Course Title: **Cytology, Genetics and Immunology**	

Objective: Students will understand the structures and purposes of basic components of prokaryotic andeukaryotic cells, especially macromolecules, membranes, and organelles. Study responses to environmentalor physiological changes, or alterations of cell function brought about by mutation for skill development, entrepreneurship and employability.

Credits: **4**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: 40

Total No. of Lectures-Tutorials-Practical (in hours per week): **L-T-P:** 4-0-0

Unit	Topics	No. of Lectures
	Part A	
I	**Structure and Function of Cell Organelles I** • Plasma membrane: chemical structure—lipids andproteins • Cell-cell interaction: cell adhesion molecules, cellularjunctions • Endomembrane system: protein targeting and sorting, endocytosis, exocytosis Introduction to all national Biologists (Zoologists) who have contributed/contributing to Zoological and Life Sciences as a mark of tribute to ancient and modern biology will be included as part of the Continuous Internal Evaluation(CIE)for developing skill and employability	**6**
II	**Structure and Function of Cell Organelles II** • Cytoskeleton: microtubules, microfilaments, intermediatefilaments • Mitochondria: Structure, oxidativephosphorylation Peroxisome and ribosome: structure andfunction. for developing skill and employability	**6**
III	**Nucleus and Chromatin Structure** • Structure and function of nucleus ineukaryotes • Chemical structure and base composition of DNA andRNA • DNA supercoiling, chromatin organization, structureof chromosomes Types of DNA andRNAfor developing skill.	**8**

IV	**Cell cycle, Cell Division and Cell Signalling** • Cell division: mitosis and meiosis • Cell cycle and its regulation, apoptosis Signal transduction: intracellular signaling and cell surface receptors, via G-protein linked receptors, JAK-STAT pathwayfor developing skill and employability.	**8**
	Part B	
V	**Mendelism and Sex Determination** • Basic principles of heredity: Mendel's laws, monohybrid and dihybrid crosses • Complete and Incomplete Dominance • Penetrance and expressivity • Genic Sex-Determining Systems, Environmental Sex Determination, Sex Determination in Drosophila, Sex Determination in Humans Sex-linked characteristics and Dosage compensationfor developing skill and employability.	**8**
VI	**Extensions of Mendelism, Genes and Environment** • Extensions of Mendelism: Multiple Alleles, Gene Interaction • The Interaction Between Sex and Heredity: Sex-Influenced and Sex-Limited Characteristics • Cytoplasmic Inheritance, Genetic Maternal Effects • Genomic Imprinting, Anticipation Interaction Between Genes and Environment: Environmental Effects on Gene Expression, Inheritance of Continuous Characteristicsfor developing skill and employability.	**8**
VII	**Human Chromosomes and Patterns of Inheritance** • Human karyotype • Chromosomal anomalies: Structural and numerical aberrations with examples • Pedigree analysis Patterns of inheritance: autosomal dominant, autosomal recessive, X-linked recessive, X-linked dominantfor developing skill and employability.	**8**
VIII	**Immune System and its Components** • Historical perspective of Immunology, Innate and Adaptive Immunity, Structure and functions of different classes of immunoglobulins, Hypersensitivity • Immune system: innate and adaptive immunity, clonal selection, complement system • Humoral immunity and cell mediated immunity • Immunoglobulin and T-cell receptor genes: organization of Ig gene loci, molecular mechanism of generation of antibody diversity HLA complex: organization, class I and II HLA molecules, expression of HLA genesfor developing and employability	**8**

Course outcomes:

The student at the completion of the course will be able to:

CO1: Understand the structure and function of all the cell organelles so as to provide entrpreneurship.

CO2: Know about the chromatin structure and its location for better development of skills.

CO3: To be familiar with the basic principle of life, how a cell divides leading to the grow of an organismand also reproduces to form new organisms and how one cell communicates with its neighboringcells and thus developing entrepreneurship.
CO4: Understand the basic principles of genetics and how genes (earlier called factors) are inherited fromone generation to another
CO5: Understand the Mendel's laws and the deviations from conventional patterns of inheritance for skill development.
CO6: Comprehend how environment plays an important role by interacting with genetic factors.
CO7: How to detect chromosomal aberrations in humans and study the pattern of inheritance by pedigreeanalysis in families for the development of employability.
CO8: To have an in depth understanding about Immune System & its mechanisms for understanding and development ofentrepreneurial skills.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	2	1	2	1	1	1
CO2	1	2	1	2	1	1	1	1
CO3	1	1	1	1	1	2	2	2
CO4	1	1	2	1	1	1	2	1
CO5	2	1	1	2	2	2	2	1
CO6	1	2	1	2	2	1	2	2
CO7	2	1	2	1	1	1	1	2
CO8	2	1	1	2	1	1	2	2

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	1	1
CO4	3	2	1

Suggested Readings:

1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA(2004).
2. Alberts et al: Molecular Biology of the Cell: Garland(2002).
3. Cooper: Cell: A Molecular Approach: ASM Press(2000).

5. Lewin B. Genes VIII. Pearson (2004).
6. Watson et al. Molecular Biology of the Gene. Pearson (2004).
7. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis KubyKuby Immunology. W H Freeman (2007).
8. Delves Peter J., Martin Seamus J., Burton Dennis R., Roitt Ivan M. Roitt's Essential Immunology, 13th Edition. Wiley Blackwell (2017).
9. Shetty Nandini Immunology Introductory Textbook. New Age International. (2005)

Course prerequisites: To study this course, a student must have had the subject biology in class/12th

B.Sc.-B.Ed. (Integrated Teacher Education) Programme

Course II

(Practical)

Programme/Class: **Certificate**/	Year: **First**	Semester: **First**
Subject: **Zoology**		
Course Code: **B050102P**	Course Title: **Cell Biology & Cytogenetics Lab**	

Objective: The main Goal of this course is to share the knowledge to the students about the experiments.The students will get a better understanding of the concept studied by them in theory course and correlatewith experimental observationsfor skill development, entrepreneurship and employability.

Credits: **2**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**

Total No. of Lectures-Tutorials-Practical (in hours per week): **L-T-P:** 0-0-4

Unit	Topics	No. of Lectures
I	1. To study different cell types such as buccal epithelial cells, neurons, striated muscle cells using Methyleneblue. 2. To study the different stages of Mitosis in root tip ofonion. 3. To study the different stages of Meiosis in grasshoppertestis. 4. To prepare molecular models of nucleotides, amino acids,dipeptides using bead and stickmethod. 5. 5. To check the permeability of cells using salt solution ofdifferent concentrations.for developing skill and employability	**15**
II	1. To study different mammalian blood cell types using Leishmanstain. 2. Determination of ABO Bloodgroup 3. Cell counting and viability test from splenocytes of farmbred animals/celllines. 4. Enumeration of red blood cells and white blood cellsusing Haemocytometer for developing skill and employability	**15**
III	1. Study of mutant phenotypes of*Drosophila.* 2. Preparation of polytenechromosomes. 3. Study of sex chromatin (Barr bodies) in buccal smear and hairbudcells(Human). 4. Preparation of human karyotype and study the chromosomal aberrations with respect to number, translocation, deletionetc. from the picturesprovided. 5. To prepare familypedigreesfor developing skill and employability	**15**
IV	**Virtual Labs** https://www.vlab.co.inhttps://zoologysan.blogspot.com www.vlab.iitb.ac.in/vlabwww.onlinelabs.inwww.powershow.com	**15**

	https://vlab.amrita.edufor developing skill and employability	

Course Learning outcomes:

CO1: To use simple and compoundmicroscopes. To prepare slides and stain them to see the cellorganellesfor developing skill and employability

CO2: Tobefamiliarwiththebasicprincipleoflife,howacelldividesleading to the growth ofanorganism and also reproduces to form neworganismsfor developing skill and employability

CO3: The chromosomal aberrations by preparingkaryotypesfor developing skill and employabilityCO4: How chromosomal aberrations are inherited in humans by pedigree analysis infamilies. The antigen-antibodyreactionfor developing skill and employability

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	2	2	2	2	2	1	1
CO2	2	1	2	1	1	1	2	1
CO3	1	2	2	1	1	2	1	2
CO4	1	1	1	2	1	1	2	1

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	1	1
CO4	3	2	1

Suggested Readings:

1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA(2004).
2. Alberts et al: Molecular Biology of the Cell: Garland (2002).
3. Cooper: Cell: A Molecular Approach: ASM Press(2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman(2004).
5. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis KubyKuby Immunology. WH Freeman (2007).
6. Kesar,SarojandVashishtaN.(2007).ExperimentalPhysiology:ComprehensiveManual.Heritage Publishers, NewDelhi

Course prerequisites: To study this course, a student must have had the subject biology in class/12th The eligibility for this paper is 10+2 from Arts/ Commerce/Science

B.Sc.-B.Ed. (Integrated Teacher Education) Programme

Course I

(Theory)

Programme/Class: **Certificate/ B.Sc.B.Ed.**	Year: **First**	Semester: **First**
Subject: **Teacher Education [TEC-1]**		
Course Code: **E030101T**	Course Title: **Development of Education in India**	

Rationale:

The past illuminates the present. Development of education is a narrative of the origin, growth, anddevelopment of educational institutions with special reference to aims of education, methods ofteaching, curriculum, teacher-taught relations discipline, etc. It helps us to understand how pastevents shaped the present education system. The problems and challenges which we are facing todayare not unique; their roots lie in our previous practices. The study of the development of educationprovides an opportunity to learn from the past. Hence a systematic study of the development of theeducation system in India enables us to conduct our personal and professional activities successfully.A critical analysis of educational theories and practices in historical perspectives encourages teachersto solve the contemporary issues/problems of education in the present contextfor developing skill and employability.

Credits: **6**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**
Total No. of Lectures-Tutorials-Practical (in hours per week): L- **4-1-1**	Total Contact Hours: **90**

Unit	Topics	No. of Lectures
I	**Indian Ethos and Education** The concept of ethos, the mechanism of the emergence of the collective consciousness (Chitti) from the individualconsciousness (Chitta) The Darshan (philosophy) of Indian ethos Major discourses on Indian ethos: losZHkoUrqlqf[ku%(vgEczákfLe] rRoefl] loZ[kyqbnaczá] ;fRi.MsrRczák.Ms] loZHkwrfgrsjrk%] vkReu% izfrdwykfuijs'kkWaulelpjsr] olq/kSDdqVqEcde~] rsuR;DrsuHkwaftFkk] ekr`nsoksHko%] fir`nsoksHko%] vkpk;kZnsoksHko% /keksZj{kfrjf{kr%] loZxqWa"kkfUr%] "k=qcqf)fouk"kk;%] ;HnznzarU=vklqo] Hknzad.ksZfHk%	**15L+5T**

	Jq.;kenso%] vkuksHknzkØrvks;UrqfoJ`r%] lR;af'koalqanje~A Discourses on the spirit of Indian ethos from the ancient period tothe contemporary period.Need and significance of the Indian ethos in educationfor for developing.	
II	**Education During the Ancient, Medieval, and British Period** • Characteristics of education of Vedic and Buddhist era with special reference to aims, curriculum, methods, teacher – taughtrelations, discipline, and educational institutions. • Characteristics of education of Islamic era with special reference to aims, curriculum, methods, teacher – taught relations, educational institutions, and disciplineMajor recommendations of Macaulay's Minute-1835, Wood's Dispatch-1854, Hunter Commission-1882, Sadler Commission 1917, Hartog Committee1929, and Sargent Plan-1944. • Gokhle's Bill and Wardha Scheme of Education. National Education Movement- 1920-22 to develop skill.	**15L+2T**
III	**Main Commissions /Committees on Education in Independent India** • Recommendations on teacher education, primary education, secondary education, higher education, and vocational Educationof the following: • University Education commission- 1948-49 • Secondary Education commission-1952-53 • Education Commission-1964-66 • National Policy on Education- 1986 & Revised NPE - 1992 • National Curriculum Framework 2005 • National Knowledge Commission Report 2007 National Education Policy- 2020for developing skill and employability.	**15L+4T**
IV	**Contemporary Issues in Education** • Quality, equity, equality, and accessibility in education withspecial reference to gender, language, region, and caste • Liberalization, privatization, and globalization • Vocationalisation and multidisciplinary approach in education • Sustainable development goals (SDGs) and education • Education for socio-economically disadvantaged groups • Right to Education Act-2009	**15L+4T**

	Education and nationalism	
Research Orientation	**Students will be required to** • Prepare a report on the topic 'education as a dynamic side ofphilosophy'. • Discuss the relevance of educational experiments of MahatmaGandhi in the present context. • Discuss the role of education in the promotion of nationalintegration and international understanding. • Conduct a field survey to record the views of the public regardingthe role of education in national for developing skill, entrepreneurship and employability.	**15P**

Course outcomes:

After the completion of this course, the students will be able to

CO1: Develop understanding of Indian ethos and its educational importance for developing skill.

CO2: Understand the characteristics, features, strengths, and weaknesses of education in ancient, medieval India and British period for enhancing skill.

CO3:Understand the contribution of various major committees and commissions on education inIndependent India for developing skill and employability.

CO4**:**Develop an understanding of the issues and challenges faced by contemporary education in India to meet local and national needs and thus for developing skill, entrepreneurship and employability.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	*2*	1	*2*	2	1	1	*1*	1
CO2	*2*	1	*2*	2	*1*	2	*2*	1
CO3	*2*	2	1	1	*2*	1	*2*	2
CO4	*2*	1	*2*	2	1	2	*2*	2

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1

CO4	3	2	1

Suggested Readings:

1. Altekar, A.S. (1934).Education in ancient India. Varanasi: The Indian Book shop.
2. Ghosh, S.C. (1989. Educational policy in India since Warren Hastings. Calcutta: Naya Prakashan.
3. Jaffar, S.M. (1936). Education in Muslim India, Lahore.
4. Kumar, K. (1991). The political agenda of education. Delhi: Sage.
5. Law, N.N. (1916). Promotion of learning in India. London.
6. Mukherjee, R.K. (1960). Ancient Indian education. Delhi: Motilal Banarasi Das.
7. Nurrullah, S., & Naik, J.P. (1951). A student's history of education in India. Bombay: Macmillan.
8. MHRD (2020). National Educational Policy-2020. New Delhi: MHRD.
9. Agnihotri, R. (1994). Adhunikbharteeyshikshasamasyayen aur samadhan. Jaipur: Rajasthan Hindi Granth Academy.
10. Chauhan, C.P.S. (1990). Higher education in India. New Delhi: Ashish Publishing House.
11. Dash, M. (2004). Education in India: Problems and perspectives. New Delhi: Atlantic Publishers.
12. Ghosh, S.C. (2009). The history of education in Modern India. New Delhi: Blackswan Publication.
13. Graves, N. (1990). Teaching for international understanding, peace and human rights. Paris: UNESCO.
14. Joshi, K.L. (1977). Problems of higher education in India. Bombay: Popular Prakashan.
15. Kumar, K. (2005): Political agenda of education: A study of colonialist and national Ideas. New Delhi: Sage Publication.
16. Mathur, V.S. (1970). Crucial problems in Indian education. New Delhi: Arya Book Depot.
17. Ministry of Education (1978). Report of the education commission 1964-66. New Delhi: Govt. of India.
18. Mohanty, J. (1987). Education in India. New Delhi: Deep and Deep Publications.
19. Mukerji, S.N. (1965). Education in India-today and tomorrow. Baroda: Acharya Book Depot.
20. Pathania, A. (2009). Primary education in India: Programmes and schemes. Shimla: J.M.D. Publication.
21. Rama Jois, M. (1998). Human rights and Indian values. New Delhi: NCTE.

This course can be opted as an elective by the students of the following subjects: Open for all

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Suggested equivalent online courses:

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Further Suggestions: ……..

B.Sc.-B.Ed. (Integrated Teacher Education) Programme

Course II

(Theory)

Programme/Class: **Certificate/ B.Sc.B.Ed.**	Year: **First**	Semester: **First**
Subject: **Teacher Education [PS-1]**		
Course Code: **E030102T**	Course Title: **Pedagogy of Sciences -1**	

Rationale:

Science is the study of phenomena and events around us. To study scientific phenomena, one needsto apply systematic observations and experimentation. To this end, this course aims to preparestudent-teachers to meet the challenges in learning, understanding, and observation of scientificphenomena. This course is designed to help student-teachers to develop their knowledge of science,use the findings of the research, and apply their learning to the evaluation and development ofappropriate curricula. This course thus requires that student-teachers demonstrate their knowledge,judgment, and skills in teaching science. This course involves the students in a wide range ofmethods and materials designed to portray the teaching of science as a student-centeredexperience. This course aims to empower student-teachers to question and challenge theirassumptions and belief systems. This course also aims to enable student-teachers to developobservation and experimentation skills to confirm their conceptions and to resolve their quest as well.Besides, this course intends to enable student-teachers to develop an interface of 'sciencetechnology-society-environment' to realize the Sustainable Development Goals 2030for developing skill and employability

Credits: **3**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**
Total No. of Lectures-Tutorials-Practical (in hours per week): L- 3-**0-1**	Total Contact Hours: **45**

Unit	Topics	No. of Lectures
I	**Understanding and Significance of Science** • Concept: Nature of science, distinguishing science from nonscience, trusting science, evolution, and practice of science as a human endeavor, distinguish science from technology and fromother ways of knowing the world, • Understanding: science as a process, science as a body of	**10L**

	knowledge, evolution of science as a discipline, scientific literacy, scientific thinking, scientific attitude, scientific temper,sources of knowledge in sciences, • Significance: Interdependence between sciences and society,sciences for social, economic, educational, technological, industrial, agricultural, environmental, and sustainabledevelopment for the development of skill.	
II	**Generating and Communicating Scientific Knowledge** • Scientific inquiry: Defining the problem, framing research questions, formulating research hypothesis, designing a scientificinvestigation, methods for data collection • Collection and processing of data: Collecting and recording data, organizing and transforming data into numerical and diagrammatic forms, presenting data in a variety of ways,analyzing and interpreting data, drawing conclusions • Communication: Presenting scientific information, acknowledging sources, communicating scientific informationusing scientific language, using ICT to access, process, andcommunicate scientific informationfor developing skill and employability	**10L**
III	**Knowledge and Curriculum of Sciences** • Knowledge: The concept of pedagogical content knowledge(PCK), content knowledge (CK), pedagogical knowledge (PK),technological k knowledge (TK), pedagogical contenttechnological knowledge (PCTK), and its implications forteaching. • Curriculum: Sciences and school curriculum, sciences as adiscipline in the school curriculum, the curriculum of sciences atthe upper primary and secondary level • Pedagogical planning: considerations about the content(curriculum and concepts) and learners (with specific reference tothe socio-cultural and developmental context of the learnerincluding special needs)for developing skill and employability	**10L**
IV	**Preparing and Planning for Teaching of Science** • Understanding: Relating the concepts of science to contemporary, historical, technological, ethical, environmental, and other societal issues, articulating and interpreting the unifying concepts, ideas, and relationships in physics, chemistry, biology,and/or earth science • Preparing for Teaching: Concept and principles of teaching science, aims and objectives of teaching science at a different level of school education, Bloom's Taxonomy, Modified taxonomy by Anderson-Krathwahl, Science-Technology-Society-Environment (STSE) approach of science teaching	**10L**

	• Planning and constructing: Unit plans, resource units, audiovisualMaterials for developing skill and employability	
Practicum	**Students will be required to** • Prepare a unit plan. • Organize a science exhibition at a secondary school. • Form a science club and organize events to develop Sciencetechnology-society-environment (STSE) interface.	**5P**

Course outcomes:

After the completion of this course, the students will be able to

CO1:Develop an understanding of the nature, branches and scope of science for developing skill and employability

CO2: Develop understanding of generating and communicating knowledge in sciencefor for developing skill and employability

CO3:Understand and explain relation between knowelege and curriculum in sciences.

CO4: Enhance skills of preparing and planning teaching of scienceso as local needs could be meet forfor developing skill and employability

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	*2*	*2*	1	1	*2*	2	1
CO2	1	*3*	*2*	1	1	1	1	*2*
CO3	2	1	*1*	2	1	*2*	1	*2*
CO4	1	*2*	2	1	2	1	2	*2*

CO-Curriculum Enrichment Mapping (Please write 3,2,1wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

Suggested Readings:

1. Chalmers, A. (1999). What is the thing called science? Buckingham, UK: Open UniversityPress.
2. Chiappetta, L. E., &Koballa, R. T. (2010). Science instruction in the middle and secondaryschools. USA: Allyn& Bacon.
3. Cobern, W. W. (1998). Socio-cultural perspectives on science education. London: KluwerAcademic Publisher.
4. Driver, R., Squires, A., Rushworth, P., & Wood- Robinson, V. (2006). Making sense ofsecondary science: Research into children's ideas. London: Routledge Palmer.
5. Kuhn, T. S. (1970). The structure of scientific revolutions. Chicago: University of Chicago
6. Martin R., Sexton, C. Wagner, K., &Gerlorich, J. (1998). Science for all children. USA:Allyn and Bacon.
7. NCERT. (2005). Position paper on teaching of science, national curriculum framework. NewDelhi: NCERT.
8. Sears, J., & Sorensen, P. (Eds.). (2000). Issues in science teaching. The Netherlands:RoutledgeFalmer.
9. Siddiqi and Siddiqi. (2002). Teaching of science today and tomorrow. New Delhi: DoabaHouse.
10. Sundarajan, S. (1995). Teaching science in middle school: A resource book. Orient Longman:Hyderabad.
11. Turner, T., &Dimatea, W. (1998). Learning to teach science in secondary school. USA:Routledge Publication.
12. UNESCO. (1966). Source book for science teaching. Paris: UNESCO.
13. Vaidya, N. (1999). Science teaching for the 21st century. New Delhi: Deep and DeepPublishers.
14. Wallace, J., & Louden, W. (Eds.) (2001). Dilemmas of science teaching: Perspectives onproblems of practice. London: Routledge.
15. Wellington, J. (2004). Teaching and learning secondary science – contemporary issues andpractical approaches. London: Routledge.

This course can be opted as an elective by the students of the following subjects: Open for all……

Suggested equivalent online courses:

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Further Suggestions:

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B.Sc.-B.Ed. (Integrated Teacher Education) Programme

Course I

(Theory)

Programme/Class: **Certificate/ BSc BEd**	Year: **First**	Semester: **First**
Subject: **Co-Curricular Course**		
Course Code: **Z010101T**	Course Title: **Food, Nutrition and Hygiene**	
Credits: **2**	Core Compulsory	
Max. Marks: **25+75**	Min. Passing Marks: **40**	
Total No. of Lectures-Tutorials-Practical (in hours per week): L- **2/w**		

Unit	**Topics**	**No. of Lectures Total=30**
I	Concept of Food and Nutrition (a) Definition of Food, Nutrients, Nutrition, Health, balanced Diet (b) Types of Nutrition- Optimum Nutrition, under Nutrition, OverNutrition (c) Meal planning- Concept and factors affecting Meal Planning (d) Food groups and functions of foodfor developing skill.	**8**
II	Nutrients: Macro and Micro RDA, Sources, Functions, Deficiency and excess of (a) Carbohydrate (b) Fats (c) Protein (d) Minerals Major: Calcium, Phosphorus, Sodium, Potassium Trace: Iron, Iodine, Fluorine, Zinc (e) Vitamins Water soluble vitamins: Vitamin B, C	**8**

	Fat soluble vitamins: Vitamin A, D, E, K (f) Water (g) Dietary Fibrefor developing skill.	
III	1000 days Nutrition (a) Concept, Requirement, Factors affecting growth of child (b) Prenatal Nutrition (0 - 280 days): Additional Nutrients' Requirement and risk factors during pregnancy (c) Breast / Formula Feeding (Birth – 6 months of age) (d) Complementary and Early Diet (6 months – 2 years of age) for developing skill and employability.	**8**
IV	Community Health Concept (a) Common diseases prevalent in the society and its causes (b) National and International Program and Policies for improving Dietary Nutrition c) Nutrition requirement in the following Diabetes Hypertension Obesity Constipation Diarrhea Typhoid (d) Immunity Boosting Foodfor developing skill.	7

Course outcomes:

On completion of this course, learners will be able to:

CO1: To learn the basic concept of the Food and Nutrition for developing skills.

CO2: To study the nutritive requirement during special conditions like pregnancy and lactationfor developing skill and employability

CO3: To learn meal planning.To learn 100 days Nutrition Conceptfor developing skill and employability

CO4: To study common health issues in the society. To learn the special requirement of food during common illness for enhancing skills.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	*2*	*2*	1	1	*2*	2	1
CO2	1	*3*	*2*	1	1	1	1	*2*
CO3	2	1	*1*	2	1	*2*	1	*2*
CO4	1	*2*	2	1	2	1	2	*2*

CO-Curriculum Enrichment Mapping (Please write 3,2,1wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

Suggested equivalent online courses:

https://www.udemy.com/course/internationally-accredited-diploma-certificate-in-nutrition

Diploma in Human Nutrition-Revised Offered by Alison

Further Suggestions:……..

Structure, Syllabus & Evaluation Scheme
B.Ed. Integrated (B.Sc.-B.Ed.) Programme
Course Structure
Semester-II

Year: First			**Semester:** Second				
Subject Description	**Subject Code**	**Subject Title (Theory & Practical)**	**Credits**	**Continuous Internal Evaluation (CIE)**	**University Exam. (UE)**	**Max. Marks**	
					Theory	Practical	
Choose any Two Subjects (Core Course) on the Basis of Semester-I							
Physics	B010201T	ThermalPhysics&SemiconductorDevices	04	25	75	--	100
	B010202P	ThermalPropertiesofMatter&ElectronicCircuits	02	25	--	75	100
Chemistry	B020201T	Bioorganic and Medicinal Chemistry	04	25	75	--	100
	B020202P	Biochemical Analysis	02	25	--	75	100
Mathematics	B030201T	MatricesandDifferentialEquations &Geometry	06	25	75	--	100
Botany	B040201T	Archegoniates&Plant Architecture	04	25	75	--	100
	B040202P	Land Plants Architecture	02	25	--	75	100
Zoology	B050201T	Biochemistry and Physiology	04	25	75	--	100
	B050202P	Physiological, Biochemical & Hematology Lab	02	25	--	75	100

Teacher Education							
Course							
Teacher Education Course **[TEC-2]**	E030201T	Philosophical and Sociological Foundations of Education [TEC-2]	**6**	**25**	**75**	**--**	**100**
Elective Course							
Elective Course **[EC-1]**	TECEC-1	Special Education	**6**	**25**	**75**	**--**	**100**
Pedagogy (Vocational Course)							
Teacher Education Course **[EWP-1]**	E030202P	Engaging with Pedagogies [EWP-1]	**3**	**25**	**--**	**75**	**100**
Co-Curricular Course							
Co-Curricular Course **[CCC-2]**	Z020201	First Aids and Health	**2**	**25**	**75**	**--**	**100**
Industrial Training							
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1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class: **Certificate**	Year: **First**	Semester: **Second**
Subject: **Physics**		
Course Code: **B010201T**	Course Title: **Thermal Physics & Semiconductor Devices**	

Course Outcomes (COs)

CO1:Recognizethedifferencebetweenreversibleandirreversibleprocesses.
CO2: Develop skills toUnderstandthephysicalsignificanceofthermodynamicalpotentials.
CO3: Comprehendthekineticmodelofgasesw.r.t.variousgaslaws.
CO4:Develop skills toStudytheimplementationsandlimitationsofundamentalradiationlaws.
CO5: UtilityofACbridges.
CO6: Recognizethebasiccomponentsofelectronicdevices.
CO7: Develop skills toDesignsimpleelectroniccircuits.
CO8: Understandtheapplicationsofvariouselectronicinstruments.

Credits: **4**	
Max. Marks: **25+75**	

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: **4-0-0**

Unit	Topics	
	PART A **Thermodynamics & Kinetic Theory of Gases**	**No. of Lectures**
I	**0^{th}& 1^{st} Law of Thermodynamics** State functions and terminology of thermodynamics. Develop skills to understand the Zeroth law and temperature and its employability. First law, internal energy, heat and work done. Work done in various thermodynamical processes. Enthalpy, relation between C_P and C_V. Carnot's engine, efficiency and Carnot's theorem. Efficiency of internal combustion engines (Otto and diesel).	8
II	**2^{nd}& 3^{rd} Law of Thermodynamics** Different statements of second law, Clausius inequality, entropy and its physical significance. Entropy changes in various thermodynamical processes. Third law of thermodynamics and unattainability of absolute zero. Develop skills to understand the Thermodynamical potentials and its employability. Maxwell's relations, conditions for feasibility of a process and equilibrium of a system. Clausius- Clapeyron equation, Joule-Thompson effect.	8
III	**Kinetic Theory of Gases** Kinetic model and deduction of gas laws. Derivation of Maxwell's law of distribution of velocities and its experimental verification. Degrees of freedom, law of equipartition ofenergy (no derivation) and its application to specific heat of gases	7

	(mono, di and poly atomic).	
IV	**Theory of Radiation** Blackbody radiation, spectral distribution, concept of energy density and pressure of radiation. Develop skills to understand the Derivation of Planck's law, deduction of Wien's distribution law, Rayleigh-Jeans law,Stefan- Boltzmann law and Wien's displacement law from Planck's law.	7

PART B **Circuit Fundamentals & Semiconductor Devices**		
V	**DC & AC Circuits** Growth and decay of currents in RL circuit. Develop skills to understand the Charging and discharging of capacitor in RC, LC and RCL circuits. Network Analysis - Superposition, Reciprocity, Thevenin's and Norton's theorems. AC Bridges - measurement of inductance (Maxwell's, Owen's and Anderson's bridges) and measurement of capacitance (Schering's, Wein's and de Sauty's bridges).	6
VI	**Semiconductors & Diodes** P and N type semiconductors, qualitative idea of Fermi level. Formation of depletion layer in PN junction diode, field & potential at the depletion layer. Qualitative idea of current flow mechanism in forward & reverse biased diode. Diode fabrication. Develop skills to understand the PN junction diode and its characteristics, static and dynamic resistance. Principle, structure, characteristics and applications of Zener, Tunnel, Light Emitting, Point Contact and Photo diodes. Half and Full wave rectifiers, calculation of ripple factor,rectificationefficiencyandvoltageregulation.Basicideaaboutfiltercircuitsandvoltage regulated power supply.	9
VII	**Transistors** Develop skills to understand the Bipolar Junction PNP and NPN transistors and its employability. Study of CB, CE & CC configurations w.r.t. characteristics; active, cutoff & saturation regions; current gains & relations between them. DC Load Line analysis and Q pointstabilisation.VoltageDividerbiascircuitforCEamplifier.Qualitative discussion of RC coupled voltage amplifier.	9
VIII	**Electronic Instrumentation** Multimeter: Principles of measurement of dc voltage, dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT, electron gun, electrostatic focusing and acceleration (no mathematical treatment). Front panel controls, special features of dual trace CRO, specifications of a CRO and their significance. Applications of CRO to study the waveform and measurement of voltage, current, frequency & phase difference.	6

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	1	2	3	2
CO2	2	2	2	2	3	1	2	2
CO3	2	1	3	2	2	3	3	3
CO4	2	3	1	1	3	2	3	2
CO5	2	3	2	3	2	3	2	2
CO6	1	1	1	2	1	2	2	1
CO7	1	2	3	1	1	1	1	2
CO8	1	3	3	3	1	2	3	2

Co-Curriculam Enrichment Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
CO6	3	2	1
CO7	3	2	1
CO8	3	2	1

Suggested Readings

PART A

1. M.W. Zemansky, R. Dittman, "Heat and Thermodynamics", McGraw Hill, 1997,7e
2. F.W. Sears, G.L. Salinger, "Thermodynamics, Kinetic theory & Statistical thermodynamics", Narosa Publishing House, 1998
3. Enrico Fermi, "Thermodynamics", Dover Publications, 1956
4. S. Garg, R. Bansal, C. Ghosh, "Thermal Physics", McGraw Hill, 2012,2e
5. MeghnadSaha, B.N. Srivastava, "A Treatise on Heat", Indian Press, 1973,5e

PART B

1. B.G. Streetman, S.K. Banerjee, “Solid State Electronic Devices”, Pearson Education India, 2015,7e
2. W.D. Stanley, “Electronic Devices: Circuits and Applications”, Longman Higher Education,1989
3. J.D. Ryder, “Electronic Fundamentals and Applications”, Prentice-Hall of India Private Limited, 1975,5e
4. S.L. Gupta, V. Kumar, “Hand Book of Electronics”, Pragati Prakashan, Meerut, 2016,43e

Course Books published in Hindi may be prescribed by the Universities.

Suggestive Digital Platforms / Web Links
1. MIT Open Learning - Massachusetts Institute of Technology,https://openlearning.mit.edu/ 2. National Programme on Technology Enhanced Learning (NPTEL),https://www.youtube.com/user/nptelhrd 3. Uttar Pradesh Higher Education Digital Library,http://heecontent.upsdc.gov.in/SearchContent.aspx 4. Swayam Prabha - DTH Channel,https://www.swayamprabha.gov.in/index.php/program/current_he/8
This course can be opted as an Elective by the students of following subjects
Open to all
Course Prerequisites
Physics in 12th / Chemistry in 12th
Suggested Equivalent Online Courses
1. Coursera,https://www.coursera.org/browse/physical-science-and-engineering/physics-and-astronomy 2. edX,https://www.edx.org/course/subject/physics 3. MIT Open Course Ware - Massachusetts Institute of Technology,https://ocw.mit.edu/courses/physics/ 4. Swayam - Government of India,https://swayam.gov.in/explorer?category=Physics 5. National Programme on Technology Enhanced Learning (NPTEL),https://nptel.ac.in/course.html
Further Suggestions
• In End-Semester University Examinations, equal weightage should be given to Part A (units I to IV) andPart B (units V to VIII) while framing the questions.

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course II
(Practical)

Programme/Class: **Certificate**	Year: **First**	Semester: **Second**
Subject: **Physics**		
Course Code: **B010202P**	Course Title: **Thermal Properties of Matter & Electronic Circuits**	

Course Outcomes (COs)

CO1:Experimentalphysicshasthemoststrikingimpactontheindustrywherevertheinstrumentsareusedtostudyanddeterminethethermalandelectronicproperties.

CO2: Develop skills of Measurementprecisionandperfectionisachievedthrough LabExperiments.

CO3: OnlineVirtualLabExperimentsgiveaninsightinsimulationtechniquesandprovideabasisformodeling.

Credits: **2**	Core Compulsory / Elective
Max. Marks: **25+75**	Min. Passing Marks:40

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: **0-0-4**

Unit	Topics	No. of Lectures
	Lab Experiment List	60
	1. Develop skills to determine the Mechanical Equivalent of Heat by Callender and Barne'smethod 2. Coefficient of thermal conductivity of copper by Searle'sapparatus 3. Coefficient of thermal conductivity ofrubber 4. Coefficient of thermal conductivity of a bad conductor by Lee and Charlton's discmethod 5. Value of Stefan'sconstant 6. Develop skills to understand the Verification of Stefan'slaw 7. Variation of thermo-emf across two junctions of a thermocouple withtemperature 8. Develop skills to determine the Temperature coefficient of resistance by Platinum resistancethermometer 9. Charging and discharging in RC and RCLcircuits 10. A.C. Bridges: Various experiments based on measurement of L andC 11. Resonance in series and parallel RCLcircuit 12. PN Junction, Zener and LED diodecharacteristics 13. Half wave and full waverectifiers 14. Characteristics of a transistor (PNP and NPN) in CE, CB and CCconfigurations 15. Frequency response of RC coupledamplifier 16. Handling of Cathode Ray Oscilloscope(CRO)	
	Online Virtual Lab Experiment List / Link	

Thermal Properties of Matter:

Virtual Labs at Amrita Vishwa Vidyapeetham

https://vlab.amrita.edu/?sub=1&brch=194

1. Heat transfer byradiation
2. Heat transfer byconduction
3. Heat transfer by naturalconvection
4. Develop skills to The study of phasechange
5. Black body radiation: Determination of Stefan'sconstant
6. Newton's law ofcooling
7. Lee's discapparatus
8. Develop skills to understand the Thermo-couple: Seebeckeffects

Semiconductor Devices:

Virtual Labs an initiative of MHRD Govt. of India

http://vlabs.iitkgp.ernet.in/be/index.html#

1. Familiarisationwithresistor
2. Familiarisationwithcapacitor
3. Familiarisationwithinductor
4. Ohm'sLaw
5. VI characteristics of adiode
6. Develop skills to understand the Half & Full wave rectification
7. Capacitativerectification
8. Zener Diode voltageregulator
9. BJT common emittercharacteristics
10. BJT common basecharacteristics
11. Studies on BJT CEamplifier
12. RC frequencyresponse

Suggested Readings
1. B.L. Worsnop, H.T. Flint, "Advanced Practical Physics for Students", Methuen & Co., Ltd., London, 1962,9e 2. S. Panigrahi, B. Mallick, "Engineering Practical Physics", Cengage Learning India Pvt. Ltd., 2015,1e 3. S.L. Gupta, V. Kumar, "Practical Physics", Pragati Prakashan, Meerut, 2014,2e ***Course Books published in Hindi may be prescribed by the Universities***.
Suggestive Digital Platforms / Web Links
1. Virtual Labs at Amrita Vishwa Vidyapeetham,https://vlab.amrita.edu/?sub=1&brch=194 2. Virtual Labs an initiative of MHRD Govt. of India,http://vlabs.iitkgp.ernet.in/be/index.html# 3. Digital platforms of other virtuallabs
This course can be opted as an Elective by the students of following subjects
Botany / Chemistry / Computer Science / Mathematics / Statistics / Zoology
Course Prerequisites
Opted / Passed Semester II, Theory Paper-1 (B010201T)
Suggested Equivalent Online Courses
Further Suggestions
• The institution may add / modify / change the experiments of the same standard in thesubject. • The institution may suggest a minimum number of experiments (say 6) to be performed by each student per semester from the Lab ExperimentList. • Theinstitutionmaysuggestaminimumnumberofexperiments(say3)tobeperformedbyeachstudentper semester from the Online Virtual Lab Experiment List / Link.

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme: Certificate in Bioorganic and Medicinal Chemistry	Year: **1**	Semester: **II**
Subject: **Chemistry**		
Course Code: **B020201T**	Course Title: **Bioorganic and MedicinalChemistry**	

Course outcomes:

CO1: Understand classification, nomenclature, preparation and properties of carbohydrates.

CO2:Develop skills to learn the synthesis, properties and mechanism of action of proteins.

CO3:Learn about cconstitution, structure, synthesis and biological role of nucleic acids.

CO4:Understand the concept of drug discovery, design and development.

CO5:Understandthelaws of crystallography and determine structure ofcrystals.

CO6:Understand the importance of macromolecules/polymers in day to day life and apply the knowledge in sustainable development.

CO7: Learn about the techniques involved in polymerization as well as mechanism and kinetics o polymerization

CO8: Learn about the preparation and properties of various kinds of dyes.

Credits: 4	Elective
Max. Marks: 25+75	Min. Passing Marks:40

Total No. of Lectures = 60

Unit	Topics	No. of Lectures
I	**Chemistry of Carbohydrates**: Classification of carbohydrates, reducing and non-reducing sugars, General Properties of Glucose and Fructose, their open chain structure. Epimers, mutarotation and anomers. Mechanism of mutarotation Determination of configuration of Glucose (Fischer's proof). Cyclic structure of glucose. Haworth projections. Cyclic structure offructose.Interconversionsofsugars(ascendinganddescendingofsugarseries,conversion of aldoses to ketoses). Lobry de Bruyn-van Ekenstein rearrangement; stepping–up (Kiliani- Fischer method) and stepping–down (Ruff's &Wohl's methods) of aldoses; end-group-interchangeofaldosesLinkagebetweenmonosachharides,structureofdisacharrides(sucrose, maltose, lactose) and polysacharrides (starch and cellulose) excluding their structure elucidation. Importance of carbohydrates in development of employability in research and development.	10

II	**Chemistry of Proteins:** Classification *of amino acids*, zwitter ion structure and Isoelectric point. Overview of primary, secondary, tertiary and quaternary structure of proteins. Determination of primary structure of peptides, determination of N-terminal amino acid (by DNFB and Edman method) and C–terminal amino acid (by thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides (upto dipeptides) by N-protection & C-activating groups and Merrifield solid phase synthesis. Protein denaturation/ renaturation Mechanism of enzyme action, factors affecting enzyme action, Coenzymes and cofactorsandtheir role in biological reactions, Specificity of enzymeaction(Including stereospecifity), Enzymeinhibitorsandtheirimportance for employability opportunities in different chemical sectors.	10

III	**Chemistry of Nucleic Acids:** Constituents of Nucleic acids: Adenine, guanine, thymine and Cytosine(Structureonly),Nucleosidesandnucleotides**(nomenclature**),Synthesisofnucleic acids,Structureofpolynucleotides;StructureofDNA(Watson-Crickmodel)andRNA(**types ofRNA**),GeneticCode,BiologicalrolesofDNAandRNA:Replication,Transcriptionand Translation	05
IV	**Introductory Medicinal Chemistry:** Drug discovery, design and development; Basic Retrosyntheticapproach.Drugaction-receptortheory.Structure–activityrelationshipsofdrug molecules, binding role of –OH group,-NH_2 group, double bond and aromatic ring. Synthesis oftherepresentativedrugsofthefollowingclasses:analgesicsagents,antipyreticagents,anti- inflammatory agents (Aspirin, paracetamol); antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulphanethoxazol, Sulphacetamide); antiviral agents (Acyclovir),CentralNervousSystemagents(Phenobarbital,Diazepam),Cardiovascular (Glyceryl trinitrate), HIV-AIDS related drugs (AZT- Zidovudine	10
V	**Solid State** Definition of space lattice, unit cell. Laws of crystallography – (i) Law of constancy of interfacialangles,(ii)Lawofrationalityofindicesandiii)Symmetryelementsincrystalsand law of symmetry .X-ray diffraction by crystals. Derivation of Bragg equation.Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).	05
VI	**Introduction to Polymer** Monomers, Oligomers, Polymers and their characteristics, Classification of polymers : Natural synthetic, linear, cross linked and network; plastics, elastomers, fibres, Homopolymers and Co-polymers, Bonding in polymers : Primary and secondary bond forces in polymers ; cohesive energy, and decomposition of polymers. Determination of Molecular massofpolymers:NumberAveragemolecularmass(Mn)andWeightaveragemolecularmass (Mw) of polymers and determination by (i) Viscosity (ii) Light scattering method (iii) Gel permeation chromatography (iv) Osmometry andUltracentrifuging. **Silicones and Phosphazenes**–Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.	10
VII	**Kinetics and Mechanism of Polymerization** Polymerization techniques, Mechanism and kinetics of copolymerization,Addition or chain-growthpolymerization,Freeradicalvinylpolymerization,ionicvinylpolymerization,Ziegler- Natta polymerization and vinyl polymers, Condensation or step growth-polymerization,Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxyresins and polyurethanes, Natural and synthetic rubbers, Elementary idea oforganic conducting polymers.	05

VIII	**Synthetic Dyes:** Colour and constitution (electronic Concept), Classification of dye Chemistry and synthesis of Methyl orange, Congo red, Malachite gree crystalviolet, phenolphthalein, fluorescein, Alizarin and Indigo. Application of dy in development of employability in research and development and at industri level.	0 5

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs):
(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	3	2	2	2	3
CO2	2	2	2	3	2	2	2	3
CO3	2	2	2	3	2	2	2	3
CO4	2	2	2	3	2	2	2	3
CO5	3	2	3	1	2	2	2	1
CO6	2	2	2	3	2	2	2	1
CO7	3	2	3	1	2	2	2	1
CO8	1	1	2	3	2	2	2	3

Co-Curriculam Enrichment Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship
CO1	3	2	1
CO2	3	2	2
CO3	3	2	1
CO4	3	3	2
CO5	3	2	2
CO6	3	3	1
CO7	3	3	1
CO8	3	3	1

Suggested Readings:

1. Davis, B. G., Fairbanks, A. J., *Carbohydrate Chemistry*, Oxford Chemistry Primer, Oxford UniversityPress.
2. Finar, I. L. *Organic Chemistry* (*Volume 2)*, Dorling Kindersley (India) Pvt. Ltd.(PearsonEducation).
3. Nelson, D. L. & Cox, M. M. *Lehninger's Principles of Bioch*emistry *7th Ed.*, W. H.Freeman.
4. Berg, J. M., Tymoczko, J. L. &Stryer, L. *Biochemistry 7th Ed.*, W. H.Freeman.
5. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).
6. Patrick, G. L. Introduction to Medicinal Chemistry, Oxford University Press, UK,2013.
7. Singh, H. & Kapoor, V.K. Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, Pitampura, NewDelhi, 2012.
8. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry Ed., Oxford University Press 13(2006).
9. Ball, D. W. Physical Chemistry Thomson Press, India(2007).
10. Castellan, G. W. Physical Chemistry 4th Ed. Narosa(2004).
11. R.B. Seymour & C.E. Carraher: *Polymer Chemistry: An Introduction*, Marcel Dekker, Inc. New York, 1981.
12. G.Odian: *Principles of Polymerization*, 4thEd.Wiley, 2004.
13. F.W. Billmeyer:*Textbookof Polymer Science*, 2ndEd. WileyInterscience,1971.
14. P. Ghosh: Polymer Science & Technology, Tata McGraw-Hill Education,1991

Note: For the promotion of Hindi language, course books published in Hindi may be prescribed by the University

Suggested online links:

http://heecontent.upsdc.gov.in/Home.aspx

https://nptel.ac.in/courses/104/105/104105124/

https://nptel.ac.in/courses/103/106/105106204/

https://nptel.ac.in/courses/104/105/104105034/

https://nptel.ac.in/courses/104/103/104103121/

https://nptel.ac.in/courses/104/102/104102016/

https://nptel.ac.in/courses/104/106/104106106/

https://nptel.ac.in/courses/104/105/104105120/

This course can be opted as an elective by the students of following subjects: Chemistry in 12 th Class

Course prerequisites: To study this course, a student must have Passed Sem-I, Theory paper-1

Suggested equivalent online courses:

……..

Further Suggestions:

……..

st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course II
(Practical)

Programme: **BSc BEd**	Year: **I**	Semester: **II**
Subject: **Chemistry**		
Course Code: **B020202P**	Course Title: **Biochemical Analysis**	

Course outcomes:

CO1:Understandthequalitativeandquantitativeanalysis.
CO2:Determinequalitativeandquantitativeinformationforproteins,aminoacidsandfats.CC
CO3:Determineandextractnucleicacids.
CO4:Synthesizedrugmoleculessuchaspropranolol,aspirinandbarbituricacid.
.

Credits: 2	Elective
Max. Marks: 25+75 = 100	Min. Passing Marks:40

Practical60-h

Unit	Topics	No of Lectures
I	**Qualitative and quantitative analysis of Carbohydrates:** . 1. Separation of a mixture of two sugars by ascending paperchromatography 2. Differentiate between a reducing/ nonreducingsugar 3. Synthesis ofOsazones.	**15**
II	**Qualitative and quantitative analysis of Proteins, amino acids and Fats** 1. Isolation ofprotein. 2. Determination of protein by the Biuretreaction. 3. TLC separation of a mixture containing 2/3 aminoacids 4. Paper chromatographic separation of a mixture containing 2/3 aminoacids 5. Action of salivary amylase onstarch 6. To determine the concentration of glycine solution by formylationmethod. 7. To determine the saponification value of anoil/fat. 8. To determine the iodine value of anoil/fat	**20**
III	**Determination and identification of Nucleic Acids** 1. Determination of nucleicacids 2. Extraction of DNA fromonion/cauliflower	**12**

IV	**Synthesis of Simple drug molecules** 1. To synthesize aspirin by acetylation of salicylic acid and compare it withthe ingredient of an aspirin tablet byTLC. 2. Synthesis of barbituric acid 3. Synthesis ofpropranolol	**13**

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4
CO1	3		2	
CO2	2	3	3	3
CO3	2	2		1
CO4	1	2		

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

SuggestedReadings:

1. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. *Practical Organic Chemistry, 5th Ed.*, Pearson (2012).
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* PearsonEducation.
3. *Vogel's Qualitative Inorganic Analysis*, Revised by G.Svehla.
4. Vogel, A.I. *A Textbook of Quantitative Analysis*, ELBS.1986
5. Furniss, B.S.; Hannaford, A.J.; Rogers, V.; Smith, P.W.G.; Tatchell, A.R. *Vogel's Textbook of Practical Organic Chemistry*,ELBS.
6. Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry*,UniversitiesPres
7. Cooper, T.G. Tool of Biochemistry. Wiley-Blackwell(1977).
8. Wilson, K. & Walker, J. Practical Biochemistry. Cambridge University Press(2009).
9. Varley, H., Gowenlock, A.H & Bell, M.: Practical Clinical Biochemistry,Heinemann,

Note: For the promotion of Hindi language, course books published in Hindi may be prescribed by the University

Suggestive digital platforms web links

1. https://www.labster.com/chemistry-virtual-labs/
2. https://www.vlab.co.in/broad-area-chemical-sciences
3. **http://chemcollective.org/vlabs**

This course can be opted as an elective by the students of following subjects: Chemistry in 12 th Class
Course prerequisites: To study this course, a student must have Opted Sem-II, Theory Ppaer-1**.**
Suggested equivalent online courses: ……..
Further Suggestions: ……..

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class: **CERTIFICATE**	Year: **FIRST**	Semester: **SECOND**
Subject:**Mathematics**		
Course Code:**: B030201T**	Course Title: **Matrices and Differential Equations & Geometry**	

Course Outcomes:

After completing this course, the students will be able to:

CO1 : Perform the matrix operations of addition, multiplication and transposition and express a system of simultaneous linear equations in matrix form. Solve a system of linear equations by row-reducing its augmented form, inverse of a matrix.

CO2 :Solve the problems of Complex number, Function of complex variable, Trigonometric, Exponential, Logarithmic functions.

CO3 :Determine the different types of differential equations their solutions using different methods

CO4 :Use three dimensional geometry to understand different mathematical problems.

CO5 :Study the basic concepts regarding three dimensional geometry for better employability.

Credits: **06**	Paper:**CoreCompulsory**
Max.Marks: **25+75**	Min.Pass Marks: **40**

TotalNo.of Lectures-Tutorials-Practical(inhoursperweek):**6-0-0**.

Unit	Topic	No.ofLectures
	PART-A **Matrices and Differential Equations**	
I	Types of Matrices, Elementary operations on Matrices, Rank of a Matrix, Echelon form of a Matrix, Normal form of a Matrix, Inverse of a Matrix by elementary operations, System of linear homogeneous and non-homogeneous equations, Theorems on consistency of a system of linear equationsfor skill development.	12
II	Eigen values, Eigen vectors and characteristic equation of a matrix, Caley-Hamilton theorem and its use in finding inverse of a matrix, Complex functions and separation into real and imaginary parts, Exponential and Logarithmic functions Inverse trigonometric and hyperbolic functionsfor skill development.	11

III	Formation of differential equations, Geometrical meaning of a differential equationfor better understanding of concept, Equation of first order and first degree, Equation in which the variables are separable, Homogeneous equations, Exact differential equations and equations reducible to the exact form, Linear equations.	11
IV	First order higher degree equations solvable for x, y, p, Clairaut's equation and singular solutions, orthogonal trajectories, Linear differential equation of order greater than one with constant coefficients, Cauchy- Eulerformfor skill development.	11
	PART-B: Geometry	
V	General equation of second degree, System of conics, Tracing of conics, Confocal conics, Polar equation of conics and its propertiesto develop skills.	12
VI	Three-Dimensional Coordinates, Projection and Direction Cosine, Plane (Cartesian and vector form), Straight line in three dimension(Cartesian and vector form) to develop skills.	11
VII	Sphere, Cone and Cylinder to develop skills.	11
VIII	Central conicoids, Paraboloids, Plane section of conicoids, Generating lines, Confocal conicoids, Reduction of second degreeequations to develop skills.	11

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	3	3	3	2
CO2	2	3	1	1	3	2	2	3
CO3	1	1	3	3	2	2	1	1
CO4	3	2	3	2	3	3	3	2
CO5	3	3	2	3	1	1	3	2

CO- Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	Skill Development	Employability	Entrepreneurship
CO1	3	1	1
CO2	3	2	1

CO3	3	1	1
CO4	3	2	1
CO5	3	1	1

SuggestedReadings:

1. Stephen H. Friedberg, A.J Insel& L.E. Spence, Linear Algebra,Person
2. B. Rai, D.P. Choudhary & H. J. Freedman, A Course in Differential Equations,Narosa
3. D.A. Murray, Introductory Course in Differential Equations, OrientLongman
4. Suggested digitalplateform:NPTEL/SWAYAM/MOOCs
5. Course Books published in Hindi may be prescribed by theUniversities.
6. Robert J.T Bell, Elementary Treatise on Coordinate Geometry of three dimensions, Macmillan IndiaLtd.
7. P.R. Vittal, Analytical Geometry 2d & 3D,Pearson.
8. S.L. Loney, The Elements of Coordinate Geometry, McMillan andCompany,London.
9. R.J.T. Bill, Elementary Treatise on Coordinate Geometry of Three Dimensions, McMillan India Ltd.,1994.
10. Suggested digitalplateform:NPTEL/SWAYAM/MOOCs
11. Course Books (text/reference) published in Hindi may be prescribed by the Universities at locallevels.

- This coursecanbeoptedas an electivebythestudents of followingsubjects:
- Opento all

Course prerequisites: To study this course, a student must have subject Mathematics in class 12^{th}

Suggested equivalent online courses:

Further Suggestions:

(Text markedwith* arefor detailed study)

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme /Class: B.Sc. BEd	Year: **I**	Semester: **II** **Paper-I**
Subject: **Botany**		
Course Code**: B040201T**	Course Title: **Archegoniates and Plant Architecture**	

Course outcomes:

After the completion of the course the students will be able to:

CO1: Develop critical understanding on morphology, anatomy and reproduction of Bryophytes to develop skills.
CO2: Develop critical understanding on morphology, anatomy and reproduction of Pteridophytes.
CO3: Develop critical understanding on morphology, anatomy and reproduction of Gymnosperms.
CO4: Understanding of plant evolution and their transition to landhabitat.
CO5: Understand morphology, anatomy, reproduction and developmental changes therein through typological studyand create a knowledge base in understanding the basis of plant diversity, economic values & taxonomy ofplants to develop skills.
CO6: Understand the meristems and role in plant development; primary structure of root, stem and leafto develop skills.
CO7: Compare normal secondary growth and abnormal secondary growth to develop skills.
CO8: Understand the details of external and internal structures of floweringplants to develop skills.

Credits: **4**	**Core Compulsory**
Max. Marks: **25+75**	Min. Passing Marks: 40
Total No. of Lectures-Tutorials-Practical (in hours per week): **4-0-0**	

Unit	**Topic**	**Lectures (60hrs)**
I	**Introduction to Archegoniates&Bryophytes** Unique features of archegoniates, Bryophytes: General characteristics, adaptations to land habit, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of *Riccia*, *Marchantia*, *Anthoceros and Sphagnum*. (Developmental details not to be included). Economic importance of bryophytes to develop skills.	**7**
II	**Pteridophytes** General characteristics, Early land plants (*Rhynia*). Classification (up to family)with examples, Heterospory and seed habit, stelar evolution, economic importance of Pteridophytes.	**8**

III	**Gymnosperms** Classification and distribution of gymnosperms; Salient features of Cycadales, Ginkgoales, Coniferales and Gnetales, their examples, structure and reproduction; economic importance	**8**
IV	**Palaeobotany** General account of Cycadofilicales, Bennettitales and Cordaitales; Geological time scale; Brief account of process of fossilization &types of fossils and study techniques ; Contribution of Birbal Sahni to develop skills.	**8**
V	**Angiosperm Morphology (Stem, Roots, Leaves & Flowers, Inflorescence)** Morphology and modifications of roots; Stem, leaf and bud. Types of inflorescences; flowers, flower parts, fruits and types of placentation; Definition and types of seeds.	**7**
VI	**Plant Anatomy:** Meristematic and permanent tissues, Organs (root, stem and leaf). Apical meristems & theories on apical organization - Apical cell theory, Histogen theory, Tunica - Corpus theory. Secondary growth - Root and stem- cambium (structure and function) annularrings, Anomalous secondary growth - *Bignonia*, *Boerhaavia*, *Dracaena*,*Nyctanthus* to develop skills.	**7**
VII	**Reproductive Botany** Plant Embryology, Structure of microsporangium, microsporogenesis, , Structure of megasporangium and its types, megasporogenesis, Structure and types of female gametophyte, types of pollination, Methods of pollination, Germination of pollen grain, structure of male gametophyte, Fertilization, structure of dicot and monocot embryo, Endosperm, Doublefertilization, Apomixis and polyembryony to develop skills.	**8**
VIII	**Palynology:** Pollen structure, pollen morphology, pollen allergy, Applied Palynology: Basic concepts, Palaeopalynology, Aeropalynology, Forensic palynology, Role in taxonomic evidencesto develop skills.	**7**

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs):
(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4
CO1		*3*	*2*	*1*
CO2	*2*		*1*	*2*
CO3	*3*	*2*	*2*	
CO4	*3*		*3*	*2*
CO5	*3*	*1*	*2*	*3*
CO6	*2*	*2*	*2*	
CO7	*1*	*2*		*3*
CO8		*3*	*3*	*2*

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	*3*	2	1
CO2	*3*	2	*1*
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
CO6	3	2	1
CO7	3	2	1
CO8	3	2	1

Suggested Readings:

Course Books published in Hindi may be prescribed by the Universities.

1. Gangulee H. S. and K. Kar 1992. College Botany Vol. I and II. (New Central BookAgency)
2. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd

Publishers, New Delhi,India.
3. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot,Allahabad.
4. Rashid A (1999) An Introduction to Pteridophyta, Vikas Publishing House Pvt. Ltd. NewDelhi.
5. Sharma OP (1990) Textbook of Pteridophyta. MacMillan India Ltd.Delhi.
6. Vashishtha BR, Sinha AK and Kumar A (2010) Botany for Degree Students – Pteridophyta, S. Chand andCompany,
7. Vashishtha BR, Sinha AK and Kumar A (2010) Botany for Degree Students – Gymnosperms, S. Chandand
8. Parihar NS (1976) Biology and Morphology of Pteridophytes. Central BookDepot.
9. Bhatnagar SP (1996) Gymnosperms, New Age InternationalPublisher.
10. Pandey BP (2010) College Botany Vol II S. Chand and Company, NewDelhi
11. Maheswari, P. 1971. An Introduction to Embryology of Angiosperms. McGraw Hill Book Co.,London
12. Bhattacharya et. al. 2007. A textbook of Palynology, Central, NewDelhi.
13. Bhojwani, S.S. and S. P. Bhatnagar. 2000. The Embryology of Angiosperms (4th Ed.), Vikas PublishingHouse.
14. P.K.K. Nair- A textbook ofPalynology.
15. Johri, B. M. 1984. Embryology of Angiosperms. Springer-Verleg,Berlin.
16. Dutta A.C. 2016. Botany for Degree Students. Oxford UniversityPress.
17. E.J.Eames. Morphology of Vascular Plants, Standard UniversityPress.
18. Dickinson, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press,USA.
19. Fahn, A. (1974). Plant Anatomy. PergmonPress,USA.
20. Evert,R.F.(2006)Esau'sPlantAnatomy:Meristems,Cells, andTissuesofthePlantBody:TheirStructure,Function and Development. John Wiley and Sons,Inc.

This course can be opted as an elective by the students of following subjects: **Open to all but special for** B.Sc. Biotech,B.Sc. Forestry, B.Sc. Agriculture, B. Pharma, B.A. (Curators), B.A. Archaeology, B.A. Geology, BAMS

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course II
(Practical)

Programme/Class: :**BSc BEd**	Year: **I**	Semester: **II**
Subject: **Botany**		
Course Code: **B040202P**	Course Title: **Land Plants Architecture**	

Course outcomes:

CO1: The students will be made aware of the group of plants that have given rise to land habit and the flowering plants. Through field study they will be able to see these plants grow in nature and become familiar with thebiodiversity to develop skills.

CO2: Students would learn to create their small digital reports where they can capture the zoomed in and zoomed out picturesas wellasvideosincasetheyareabletofindsomerarestructureorphenomenonrelatedtot heseplants to develop skills.

CO3: Develop an understanding by observation and table study of representative members of phylogeneticallyimportant groups to learn the process of evolution in a broadsense.

CO4: Understand morphology, anatomy, reproduction and developmental changes therein through typological study and create a knowledge base in understanding plant diversity, economic values & taxonomy of lower group ofplants

CO5: Understand the composition, modifications, internal structure &architecture of flowering plants for becoming a Botanist to develop skills..

CO6: Describe the morphology and anatomy of the vascular cryptogams and gymnosperms.

CO7: Have understanding on evolution and affinities of Pteridophytes.

CO8: Have understanding on evolution and affinities of Gymnosperms.

Credits: **2**	**Core Compulsory**
Max. Marks: **25+75**	Min. Passing Marks:40

Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-2**

Unit	Topic	No. of Lectures
I	**Bryophytes:** Marchantia- morphology of thallus, W.M. rhizoids and scales, V.S. thallus through Gemma cup, W.M. gemmae (all temporary slides), V.S. antheridiophore, archegoniophore, L.S. sporophyte (all permanent slides). Sphagnum- morphology,W.M. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, L.S. capsule and	**8**

	protonemato develop skills.	
II	**Pteridophytes:** *Lycopodium*: Habit, stem T. S., stobilus V. S.,*Selaginella*: Habit, rhizophore T. S, stem T. S, axis with strobilus, V .S. of strobilus, Megasporophyll and microsporophyll.*Equisetum*-Habit, rhizome and stem T .S. and V. S. of strobilus. *Azolla* – Habitat & its structure to develop skills.	**7**
III	**Gymnosperms** 1. Cycas – seedling, coralloid root and coralloid root T. S., T. S. of leaflet and Rachis, micro and mega sporophyll, male cone V. S., micro sporophyll T. S. , entire and V. S. of ovule..Pinus - Branch of indefinite growth, spur shoot, T. S of old stem and needle R . L .SandT. L. S. of stem, male and female cone, V .S. of male and female cone..Ephedra& Thuja -: Habit, stem T. S (young and mature), leaf T. S, male and female strobilus, V. S. of male and female cone, ovule V. S. and seed.	**8**
IV	**Palaeobotany& Palynology** 1. Morphology of Rhynia and fossils gymnosperms &othergroups 2. Visit to Birbal Sahni Institute of Palaeobotany or virtual conference withtheir scientists to learnfossilization 3. Mark and know about Indian geographical sites rich in plantfossils	**6**
V	.**Angiosperm Morphology** 1. To study of diversity in leaf shape, size and other foliarfeatures. 2. To study monopodial and sympodialbranching. 3. Morphology ofFruits 4. Inflorescence types- study from fresh/ preservedspecimens 5. Flowers- study of different types from fresh/ preservedspecimens 6. Fruits- study from different types from fresh/preservedspecimens 7. Study of ovules (permanent slides/ specimens/photographs)- types(anatropous, orthotropous, amphitropousandcampylotropous) 8. Modifications in Roots,stems, leaves andinflorescences to develop skills.	**8**
VI	**PlantAnatomy:** Normal & Anomalous secondary thickening - *Bignonia, Dracaena,Boerhaviadiffusa,Nyctanthus* Study of primary and secondary growth in root and stem of monocots and dicots by section cutting and permanent slides. Study of internal structure of dicot and monocot leaves. Study of structure of stomata.	**8**

VII	**Reproductive Botany** 1. Structure of anther, microsporogenesis and pollengrains 2. Structure of ovule and embryo sac development (throughslides). 3. Study of embryo development in monocots anddicots. 4. Vegetative propagation by means of cutting, budding and graftingexercises. 5. Study of seedgermination. 6. Study of pollen morphology of the following plants – *Hibiscus, Vinca, Balsam, Ixora, Crotalaria, Bougainvillea* by microscopicobservation. 7. Calculation of pollen viability percentage using in vitro pollen germinationtechniques.	**8**
VIII	**Commercial Uses and Production technology** 1. Azollaproduction 2. Production technology ofResins 3. Production and propagation of Ornamental Pteris, Cycadales, Coniferalesfor landscaping. 4. Lab method for qualitative testing/ extraction of Ephedrine ,Taxol and Thujaoil.	**7**

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4
CO1		2	2	3
CO2	2		3	2
CO3	1	2	3	3
CO4	3	3	2	2
CO5		2	3	1
CO6	2	3	2	
CO7	2	3	3	2
CO8		*2*	*1*	*2*

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1

CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
CO6	3	2	1
CO7	3	2	1
CO8	3	2	1

Suggested Readings:

Course Books published in Hindi may be prescribed by the Universities.

1. Pandey, BP and Trivedi, P.S. 1997. Botany Vol. I(10th edition). Vikas Publishing House. Pandey, BP; Misra; Trivedi, P.S. 1997. Botany Vol. II. Vikas Publishing House.
2. Pandey, BP and Chadha. 1997. Botany Vol. III. Vikas Publishing House.
3. Santra, SC and Chatterjee. 2005. College Botany Practical Vol. I. New Central Book Agency (P) Ltd.
4. Kumar, S and Kashyap. 2003. Manual of Practical Algae. Campus Books International, New Delhi Bendre and Kumar A text book of Practical Botany. Vol I,II., Rastogi Pub. Meerut.
5. Suresh Kumar , Amar Singh Kashyap Manual of Practical Algae.. Campus Books Internet , New Delhi.
6. Santra, SC. 2005. College Botany Practical Vol. II. New Central Book Agency (P) Ltd.

Course prerequisites:

Qualification: To study this course, a student must have qualified 10+2 with Biology/ NSQF level 3 from Sector Skill Councils / Diploma holder from ITI in (Biology/ Agriculture/ Forestry).

Facilities: Smart and Interactive Class

Other Requisites: Microscopes, Stains, Dissection box, Haemocytometer, Specimens, Permanent slides, Autoclave, incubator, Oven, laminar flow cabinet, balance

Suggested equivalent online courses:

- https://www.easybiologyclass.com/topic-botanyhttp://www3.botany.ubc.ca/bryophyte/index.html
- http://ecflora.cavehill.uwi.edu/bio_courses/bl14apl/practical_3.1.htmhttp://mydunotes.blogspot.com/p/botany.html
- http://www.fao.org/3/a-v9236e.pdfhttps://iinrg.icar.gov.in/library/nrg/nrg.pdf
- https://agritech.tnau.ac.in/banking/nabard_pdf/Azolla%20Cultivation/Model_projct_on_Azolla_cultivation.pdf
- http://arnoldia.arboretum.harvard.edu/pdf/articles/1977-37-1-propagation-manual-of-selected-gymnosperms.pdf
- https://www.fs.fed.us/rm/pubs_other/wo_AgricHandbook730/wo_AgricHandbook727_153_175.pdf

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class: Certificate	**Year**: First	**Semester**: Second
Subject:**ZOOLOGY**		
Course Code:**B050201T**	Course Title:**Biochemistry and Physiology**	

Course outcomes:

The student at the completion of the course will learn:

CO1: To develop a deep understanding of structure of biomolecules like proteins, lipids and carbohydratesprovide employability and skills.

CO2: How simple molecules together form complexmacromoleculesbetter understanding of skill.

CO3: To understand the thermodynamics of enzyme catalyzedreactionsfor understanding of entrepreneurial skill.

CO4: Mechanisms of energy production at cellular and molecularlevelsentrepreneurship and employability.

CO5: To understand systems biology and various functional components of anorganismskilling of entrepreneurship.

CO6: To acquire the knowledge hormonal disorders for employability.

CO7: To explore the complex network of these functionalcomponentsfor skill development.

CO8:To comprehend the regulatory mechanisms for maintenance of function in thebodybetter understanding of skill.

Credits: 4	**Core:** Compulsory
Max. Marks: 25+75	**Min. Passing Marks:** 40

Total No. of Lectures-Tutorials-Practical (in hours per week): **L-T-P:** 4-0-0

Unit	**Topics**	**Total No. of Lectures (60)**
I	**Structure and Function of Biomolecules** • Structure and Biological importance ofcarbohydrates (Monosaccharides,Disaccharides, • Polysaccharides andGlycoconjugates) • Lipids (saturated and unsaturated fatty acids,Tri-	**8**

	acylglycerols, Phospholipids, Glycolipids,Steroids) • Structure, Classification and General properties of α-amino acids; Essentialandnon-essentialα-aminoacids,Levelsoforganizationin proteins; Simple and conjugateproteinsprovide employability and skills.	
II	**Enzyme Action and Regulation** • Nomenclature and classification of enzymes; Cofactors; Specificity of enzymeaction; • Isozymes; Mechanism of enzymeaction; • Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions; Derivation of Michaelis-Menten equation, Concept of Km and Vmax, Lineweaver-Burk plot; Enzymeinhibition; • Allosteric enzymes and their kinetics; Regulation of enzymeactionskilling of entrepreneurship.	**8**
III	**Metabolism of Carbohydrates and Lipids** • Metabolism of Carbohydrates: glycolysis, citric acidcycle, gluconeogenesis, phosphate pentosepathway • Glycogenolysis andGlycogenesis • Lipids --- Biosynthesis of palmitic acid;Ketogenesis, • β-oxidationandomega-oxidationofsaturatedfattyacidswitheven and odd number of carbonatomsbetter understanding of skill.	**8**
IV	**Metabolism of Proteins and Nucleotides** Catabolism of amino acids: Transamination, Deamination, Ureacycle Nucleotides andvitamins Review of mitochondrial respiratory chain, Oxidative phosphorylation, and itsregulationforemployability.	**6**
V	**Digestion and Respiration** Structural organization and functions of gastrointestinal tract and associatedglands Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Histology of trachea andlung Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in bloodRespiratorypigments,Dissociationcurvesandthefactors influencing it; Control of respirationfor understandingofentrepreneurial skill.	**7**

VI	**Circulation and Excretion** Components of blood and theirfunctions Haemostasis: Blood clotting system, Blood groups: Rh factor, ABO andMN Structure of mammalianheart Cardiac cycle; Cardiac output and its regulation, Electrocardiogram, Blood pressure and itsregulation Structure of kidney and its functional unit; Mechanism ofurine formation for entrepreneurship.	**8**
VII	**Nervous System and Endocrinology** Structure of neuron, resting membranepotential Origin of action potential and its propagation across the myelinated and unmyelinated nervefibers Types ofsynapse Endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas, adrenal; hormones secreted bythem Classification of hormones; Mechanism of Hormoneactionfor skill development, entrepreneurship and employability.	**8**
VIII	**Muscular System** Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanusfor skill developmentand employability.	**7**

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)
(

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	2	3	2	1	3	1
CO2	3	3	3	2	3	3	2	1
CO3	2	1	2	2	2	2	3	2
CO4	3	2	2	3	3	1	2	1
CO5	2	2	3	2	2	2	3	3
CO6	3	3	2	3	3	1	2	1
CO7	2	2	3	2	3	1	2	2
CO8	3	1	2	3	2	1	4	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required) (Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	3	1
CO2	3	1	2
CO3	3	1	1
CO4	1	3	3
CO5	3	1	2
CO6	1	3	1
CO7	3	1	1
CO8	2	1	1

Suggested Readings:

1. Nelson&Cox:Lehninger'sPrinciplesofBiochemistry:McMillan(2000)
2. Zubay*et al:* Principles of Biochemistry: WCB(1995)
3. Voet&Voet: Biochemistry Vols 1 & 2: Wiley(2004)
4. Murray*etal:*Harper'sIllustratedBiochemistry:McGrawHill(2003)ElliottandElliott:
5. Biochemistry and Molecular Biology: Oxford University Press
6. Guyton,A.C.&Hall,J.E.TextbookofMedicalPhysiology.XIEdition.HercourtAsiaPTELtd./W.B. Saunders Company.(2006).
7. Tortora,G.J.&Grabowski,S. PrinciplesofAnatomy&Physiology.XIEditionJohnWiley&sons (2006).
8. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Edition, Pearson Education (2016).
9. Hill, Richard W., et al. Animal physiology. Vol. 2. Sunderland, MA: Sinauer Associates,(2004).
10. Chatterjee C C Human Physiology Volume 1 & 2. 11th edition. CBS Publishers(2016).

Course Books published in Hindi must be prescribed by the Universities and Colleges

Course prerequisites: To study this course, a student must have had the subject biology in class/12th

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course II
(Practical)

Programme/Class: Certificate/BSc BEd	**Year**: First	**Semester**: Second
Subject: ZOOLOGY		
Course Code:**B050202P/R**	Course Title:**Physiological, Biochemical & Hematology Lab**	

Course outcomes:

The student at the completion of the course will be able to:

CO1: Understand the structure of biomolecules like proteins, lipids andcarbohydrates

CO2: Perform basic hematological laboratorytesting,

CO3: Distinguish normal and abnormal hematological laboratory findings to predict the diagnosis of hematological disorders anddiseases.

Credits: 2	**Core:** Compulsory
Max. Marks: 25+75	**Min. Passing Marks:** 40

Total No. of Lectures-Tutorials-Practical (in hours per week): **L-T-P:** 0-0-4

Unit	Topics	Total No. of Lectures (60)
I	1. EstimationofhaemoglobinusingSahli'shaemoglobinometer 2. Preparation of haemin and haemochromogencrystals 3. Recording of blood pressure using asphygmomanometer 4. Recording of blood glucose level by usingglucometer 5. Preparation of molecular models of amino acids, dipeptidesetc to develop skills.	**15**
II	1. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary,Adrenal, Thyroid andParathyroid 2. Recording of simple muscle twitch with electrical stimulation(or Virtual) 3. Demonstration of the unconditioned reflex action (Deeptendon reflex such as knee jerkreflex)	**15**

III	1. Ninhydrin test for □-aminoacids. 2. Benedict'stestforreducingsugarandiodinetestforstarch. 3. Test for sugar and acetone in urine. 4. Qualitative tests of functional groups in carbohydrates, proteinsand lipids. 5. Paper chromatography of aminoacids. 6. Action of salivary amylase under optimumconditions. to develop skills.	**15**
IV	**Virtual Labs** 1. https://www.vlab.co.in 2. https://zoologysan.blogspot.com 3. www.vlab.iitb.ac.in/vlab 4. www.onlinelabs.in 5. www.powershow.com 6. https://vlab.amrita.edu 7. https://sites.dartmouth.edu	**15**

Suggested Readings:

1. Cox,M.MandNelson,D.L.(2008).Lehninger'sPrinciplesofBiochemistry,VEdition,W.H .Freemanand Co., NewYork.
2. Berg,J.M.,Tymoczko,J.L.and Stryer,L.(2007).Biochemistry,VIEdition,W.H.FreemanandCo.,NewYork.
3. Guyton,A.C.&Hall,J.E.(2006).TextbookofMedicalPhysiology.XIEdition.HercourtAsia PTELtd./W.B. SaundersCompany.
4. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition John Wiley &sons
5. VictorP.Eroschenko.(2008).diFiore'sAtlasofHistologywithFunctionalcorrelations.XIIEdition.Lippincott W. & Wilkins.
6. Arey, L.B. (1974). Human Histology. IV Edition. W.B.Saunders.
7. Kesar, Saroj and Vashishta N. (2007). Experimental Physiology: Comprehensive Manual. Heritage Publishers, NewDelhi

Course Books published in Hindi must be prescribed by the Universities and Colleges

Course prerequisites: To study this course, a student must have had the subject biology in class/12th The eligibility for this paper is 10+2 from Arts/ Commerce/Science

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Education) Programme
Course I
(Theory)

Programme/Class: **Certificate/ B.Sc.B.Ed.**	Year: **First**	Semester: **Second**
Subject: **Teacher Education [TEC-2]**		
Course Code: **E030201T**	Course Title: **Philosophical and Sociological Foundations of Education**	

Rationale:

Knowledge of Philosophy is indispensable to understand other disciplines since questions such as theconcept, nature, and its relation to other disciplines are philosophical. Philosophy provides anunderstanding of a vision of life. It also helps to understand the world and our place within it.Philosophy aims to train our judgment through systematic analysis and critical thinking. It is asystematic reflection of reason and reality. Hence, Philosophical foundations provide us a goodunderstanding to deal with the issues of education. Teaching exists in a social climate becausestudents come into the classroom with various social values and beliefs. In this situation, the teachermust understand the social problems and social needs of the students. Hence the teacher has to havesome understanding of Sociology to deal with social as well as educational problems to provide the employability & skills,

Course outcomes:

After the completion of this course, the students will be able to

CO1:Develop understanding of concept and branches of philosophy develops skills.

CO2: Gain knowledge of educational implications of western and Indian schools of philosophy to develop the skills.

CO3:Discuss the contributions of prominent educational thinkers to education for raising the qualities of entrepreneurship.

CO4: Describe sociological perpsctives of educationto meet local needs and develop the skillsand entrepreneurship.

Credits: **6**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**

Total No. of Lectures-Tutorials-Practical (in hours per week): L- **4-1-1**	Total Contact Hours: **90**

Unit	Topics	No. of Lectures
I	**Introduction** Meaning, nature, importance, and branches of philosophywhich develops the knowledge and skills. Relationship between philosophy and education Concept of truth, welfare, and beauty according to Indian philosophy for skill development. Philosophy of education-Concept, nature, scope, and need Philosophical aims of educationfor raising the qualities of entrepreneurship.	**15L+5T**
II	**Indian and Western Schools of Philosophy** Vedant and Buddhism With special reference to with special reference to aims, curriculum, methods, teacher – taughtrelations, discipline Idealism, naturalism, and pragmatism with special reference toaims, curriculum, methods, teacher – taught relations, discipline Contribution of Indian and western schools of philosophy to thecurrent education systemto develop the skills.	**15L+2T**
III	**Prominent Indian Educational Thinkers** Vivekananda, Aurobindo,Mahatma Gandhi, Rabindranath Tagore	**15L+4T**
IV	**Education and Socialization** Sociology and education, sociology of education Education as an agent of socialization and social change Social stratification and the role of education in social mobility Constitutional Provisions for education and the role of educationinfulfillment of the constitutional promise of freedom, equality, justice, and fraternity for better skilling of entrepreneurship. Role of education in promoting national integration andinternational understanding.	**15L+4T**
Practicum	**Students will be required to** • Organize a debate on the topic 'what can we learn from ancient • Indian education system to improve present system of education'. • Prepare a detailed note about any prominent education centerduring the Buddhist period.	**15P**

	• Survey to assess the awareness of the public regarding 'Right toEducation Act -2009'and prepare a report highlighting the main findings. • Compare NEP-2020 and NPE 1986 on different parameters andgive a presentation.	

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	3	3	1	1	3
CO2	1	1	1	2	2	2	2	1
CO3	2	2	2	1	2	2	2	1
CO4	2	3	2	3	2	3	2	1

Co Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	*3*	*3*	1
CO2	*3*	3	1
CO3	*3*	*3*	1
CO4	*3*	*2*	1

Suggested Readings:

1. Bayles, E.E. (1971). Pragmatism in education. New York: Harper and Row Publishers.
2. Brubacher, J.S. (1939). Modern philosophies of education. New York: Mc-Graw Hill.
3. Butler, J.D. (1968). The four philosophies and their practices in education. New York:Harper and Row Publishers.
4. Dewey, J. (1921). Reconstruction in philosophy. London: University of London Press.
5. Oad, L.K. (1979). Shiksha ki darshnikprishthbhumi. Jaipur: Rajsthan Hindi Granth Academy.
6. Pandey, R.S. (1995). Shiksha darshan. Agra: Vinod Pustak Mandir.
7. RadhaKrishanan, S. (2002). Indian philosophy, Vol. I & II. New Delhi: Oxford UniversityPress.
8. Dewey, J. (1916). Democracy and education.
9. Durkhim, E. (1956). Education and society. New York: The Free Press.

10. Lal, R.B. (1993.). Shiksha keDarshnik aur samaj shastriyasiddhant. Meerut: RastogiPublication.
11. Mathur, S.S. (2008). Shiksha siddhant. Agra: Vinod Pustak Mandir.
12. Rao, M.S.A. (1967). Paper in the sociology of education. New Delhi: NCERT.
13. Shukla S. & Kumar, K. (1985). Sociological perspective in education. Delhi: ChanakyaPublication.

This course can be opted as an elective by the students of the following subjects: Open for all……

Suggested equivalent online courses:……..

Further Suggestions:……..

1st Year, Semester-II

B.Sc.-B.Ed. (Integrated Teacher Education) Programme

Course I

(Theory)

TECEC-1; SPECIAL EDUCATION

Course Objectives:

The objective of this course is to familiarize students ensure that children are safe and cared for, that their social and emotional needs are met and supported and that they have required support necessary for them to reach their true academic potential.

Course Content:

Unit I

Special Education, Concept, Nature, Objectives and types of special educationto provide employability. Various issues and trends in special education, Historical perspective of special education,Legislation and policies regarding special education in India for skill development.

Unit II

Education of Mental Retarded, Meaning and Characteristics of the mentally Retarded; Educable teaching strategies of the mentally retarded; Enrichment remedial and prevention programmes; mental hygiene as remediation.

Education of the visually impaired, Meaning and Characteristics, Degree of impairment, Etiology and prevention, educational programmes to develop the skills.

Unit III

Education of the hearing impaired, Meaning, Characteristics, Degree of impairment, Etiology and prevention, educational programmes.

Education of the Learning Disabled or orthopedically handicapped, Meaning, types, Characteristics and educational programmes for enhancing skills and employability.

Unit IV

Education for Gifted and Creative Children, Meaning & characteristics, Creative and identification process and Educational programmes

Education of juvenile Delinquent children, Meaning, characteristics, identification and Educational programmes for inculcating skills and employability.

Course Outcomes:

After completing this course, students will be able to:

CO1: Develop understanding of concept, objectives and historical perspectives of special education to provide employability.

CO2: Comprehend role of education for children with mental retardation to develop the skills.

CO3: Gain understanding of role of education for children with hearing impariment to develop the skills.

CO4: Enhance knowledge of education for gifted and creative children for raising the knowledge and skillsto meet their local and national needs.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	*2*	*2*	*2*	*1*	3	1	3	1
CO2	*3*	1	*2*	*2*	1	1	1	2
CO3	1	*2*	*1*	*3*	2	2	3	3
CO4	*2*	1	*2*	*3*	3	2	3	3

CO-Curriculum Enrichment Mapping (Please write 3.2.1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	2
CO2	3	1	1
CO3	3	1	1
CO4	3	1	2

Suggested Readings:

1. Dessent, T, 'Making the Ordinary School Special', The Farmer Press, London.
2. John S.W. and Merasky, 'Learning Disabilities', Allyne and Bacon.
3. Naryan J (2003), 'Educating Children with Learning Problem in Regular Schools,' N.M.H. Sikandrabad.
4. Overton T., 'Assessment in Spcial Education'. An Applied Approach', Mcmillan, New Delhi.
5. Panda, K.C., 'Education of Exceptional Children', Vikas Publishing House, New Delhi.
6. Panda, R.S. and Advani, 'Perspective in Disabilities andRehabilitation', Vikas Publishing House, New Delhi.
7. Peshwaria R. and Verma V., 'Behaviour of retartedchildren, A Manual for Teacher', N/MH, Sikandrabad.

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class: **Certificate/ B.Sc.B.Ed.**	Year: **First**	Semester: **Second**
Subject: **Teacher Education [EWP-1]**		
Course Code: **E030202P**	Course Title: **Engaging with Pedagogies-1**	

Rationale:

This course will help the students in visualizing and practicing teaching in different situations. Thiscourse will support the students in planning and practicing pedagogies theoretically learned anddiscussed in discipline-specific pedagogy course-1. This course will offer students variousopportunities to analyze, plan, and design need-based tools and techniques for instructional use as aprospective teacher.

Credits: **3**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**
Total No. of Lectures-Tutorials-Practical (in hours per week): L- **0-0-3**	Total Contact Hours: **45**

Unit	Topics	No. of Lectures
Practicum	**Every student will be required to perform the following activities:** • Analyze the secondary school curriculum of at least two educational boards, and prepare a report based on its criticalappraisal of five parameters • Design and develop five unit plans based on prescribedsecondary school curriculum related to his/her discipline. • Design and develop five lesson plans each, from both the courses,based on the topics taught to you by your teachers. • Plan, prepare, and identify traditional and online audio-visual materials helpful in the teaching of your subjects at the secondarylevel. • Design and develop an achievement test related to your subject	**45P**

Course outcomes:

After the completion of this course, the students will be able to

CO1: Analyze the secondary school curriculum from various perspective to develop the skills.

CO2: Design and develop unit and lesson plans to develop the skills.

CO3: Design and identify relevant audio-visual materials for classroom teaching to develop the skills.

CO4:Design and develop achievement tests related to their subjects to develop the skills.

Suggested Readings:

1. Costa, A.L. (2001). Developing Minds: A resource book for teaching thinking. Alexandria,VA, USA: Association for Supervision & Curriculum Development.
2. Freire, P. (1972). Pedagogy of the oppressed. New York: Herder and Herder.
3. Lang, J.M. (2016). Small teaching: Everyday lessons from the science of learning. SanFrancisco: Jossey-Bass.

This course can be opted as an elective by the students of the following subjects: Open for all

……

Suggested equivalent online courses:

……..

Further Suggestions:

……..

1st Year, Semester-II
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class: **Certificate/ BSc.-B.Ed.**	Year: **First**	Semester: **Second**
Subject: **Co-Curricular Course**		
Course Code: **Z020201**	Course Title: **First Aids and Health**	
Credits: **2**	Core Compulsory	

Course outcomes :

On completion of this course, learners will be able to:

CO1: Learn the skill needed to assess the ill or injured person, provide CPR to infants, children and adults.

CO2: Learn the skills to handle emergency child birth, Basic sex education help young people navigate thorny questions responsibly and with confidence and Sexual desire is a healthy drive.

CO3: It's a deep, powerful instinct at the core of our survival as a species. Help to understand natural changes of adolescence.

CO4: Learnthe skills to identify Mental Health status and Psychological First Aid.

Max. Marks: **25+75**	Min. Passing Marks: **40**

Total No. of Lectures-Tutorials-Practical (in hours per week): L- **2/w**

Unit	**Topics**	No. of Lectures Total= 15 Theory+ 30 Practical
I	***A. Basic First Aid*** • Aims of first aid & First aid and the law. • Dealing with an emergency, Resuscitation (basic CPR).	

	• Recovery position, Initial top to toe assessment. • Hand washing and Hygiene • Types and Content of a First aid Kit B. ***First AID Technique****for development of skills.* • Dressings and Bandages. • Fast evacuation techniques (single rescuer). • Transport techniques. C. ***First aid related with respiratory system*** • Basics of Respiration. • No breathing or difficult breathing, Drowning, Choking, Strangulation and hanging, • Swelling within the throat, Suffocation by smoke or gases and Asthma. ***D. First aid related with Heart, Blood and Circulation*** • Basics of The heart and the blood circulation. • Chest discomfort, bleeding. ***D. First aid related with Wounds and Injuries****to develop skills.* • Type of wounds, Small cuts and abrasions • Head, Chest, Abdominal injuries • Amputation, Crush injuries, Shock ***E. First aid related with Bones, Joints Muscle related injuries*** • Basics of The skeleton, Joints and Muscles. • Fractures (injuries to bones).	2 (Theory) 10 (Practical)
II	***F. First aid related with Nervous system and Unconsciousness*** • Basics of the nervous system. • Unconsciousness, Stroke, Fits – convulsions – seizures, Epilepsy. G. ***First aid related with Gastrointestinal Tract*** • Basics of The gastrointestinal system. • Diarrhea, Food poisoning. H. ***First aid related with Skin, Burns*** • Basics of The skin. • Burn wounds, Dry burns and scalds (burns from fire, heat and	

	steam). • Electrical and Chemical burns, Sun burns, heat exhaustion and heatstroke. • Frost bites (cold burns), Prevention of burns, Fever and Hypothermia. ***I. First aid related with Poisoning*** • Poisoning by swallowing, Gases, Injection, Skin ***J. First aid related with Bites and Stings*** • Animal bites, Snake bites, Insect stings and bites ***K. First aid related with Sense organs*** • Basic of Sense organ. • Foreign objects in the eye, ear, nose or skin. • Swallowed foreign objects. ***L. Specific emergency satiation and disaster management****for enhancing the knowledge and skills.* • Emergencies at educational institutes and work • Road and traffic accidents. • Emergencies in rural areas. • Disasters and multiple casualty accidents. • Triage. ***M. Emergency Child birth***	2 (Theory) 10 (Practical)
III	***Basic Sex Education*** • Overview, ground rules, and a pre-test • Basics of Urinary system and Reproductive system. • Male puberty — physical and emotional changes • Female puberty — physical and emotional changes • Male-female similarities and differences • Sexual intercourse, pregnancy, and childbirth • Facts, attitudes, and myths about LGBTQ+ issues and identities • Birth control and abortion • Sex without love — harassment, sexual abuse, and rape • Prevention of sexually transmitted diseases.	9 (Theory)
IV	Mental Health and Psychological First Aidfor entreneurship development.	

	• What is Mental Health First Aid? • Mental Health Problems in the India • The Mental Health First Aid Action Plan • Understanding Depression and Anxiety Disorders • Crisis First Aid for Suicidal Behavior& Depressive symptoms • What is Non-Suicidal Self-Injury? • Non-crisis First Aid for Depression and Anxiety • Crisis First Aid for Panic Attacks, Traumatic events • Understanding Disorders in Which Psychosis may Occur • Crisis First Aid for Acute Psychosis • Understanding Substance Use Disorder • Crisis First Aid for Overdose, Withdrawal • Using Mental Health First Aid	2 (Theory) 10 (Practical)

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	2	1	2	3	3	1
CO2	1	1	2	2	1	2	3	2
CO3	1	3	1	3	1	1	2	2
CO4	2	2	1	2	1	1	2	2

CO-Curriculum Enrichment Mapping (Please write 3,2,1wherever required)

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs):

	Skill Development	Employability.	Entrepreneurship Development
CO1	3	1	1
CO2	3	2	2
CO3	3	2	1
CO4	3	1	2

Suggested Readings:

1. Indian First Aid Mannual-https://www.indianredcross.org/publications/FA-manual.pdf
2. Red Cross First Aid/CPR/AED Instructor Manual
3. https://mhfa.com.au/courses/public/types/youthedition4
4. Finkelhor, D. (2009). The prevention of childhood sexual abuse. Durham, NH: Crimes against Children Research Center.
5. www.unh.edu/ccrc/pdf/CV192. pdf

6. Kantor L. & Levitz N. (2017). Parents' views on sex education in schools: How much do Democrats and Republicans agree? PLoSONE, 12 (7): e0180250.
7. Orenstein, P. (2016). Girls and sex: Navigating the complicated new landscape. New York, NY: Harper.
8. Schwiegershausen, E. (2015, May 28). The Cut. www.thecut.com/2015/05/most-women-are-catcalled-before-they-turn-17.html
9. Wiggins, G. & McTighe, J. (2008). Understanding by design. Alexandra, VA: ASCD.
10. https://marshallmemo.com/marshall-publications.php#8

Suggested equivalent online courses:

- https://www.redcross.org/take-a-class/first-aid/first-aid-training/first-aid-online
- https://www.firstaidforfree.com/
- https://www.coursera.org/learn/psychological-first-aid
- https://www.coursera.org/learn/mental-health

Further Suggestions:……..

SEMESTER-III

Courses	Number	Code
Core Courses (Subjects)	**2**	CC1-3, CC2-3
Teacher Education Courses	**1**	TEC-3
Pedagogy Courses	**1 (Choose anyone)**	PS-2/PSS-2/PL-2
Co-Curricular Course	**1**	CCC-3
Elective Course	**1** (either in III or IV Semester)	EC-2

Note: Course name, content, credits, and assessment scheme of CC1-3, CC2-3, CCC-3, and EC-2 will be as per the new proposed syllabus of UGprograms of Science/Arts Streams.

Structure, Syllabus & Evaluation Scheme
B.Ed. Integrated (B.Sc.-B.Ed.) Programme
Course Structure
Semester-III

Year: Second			**Semester:** Third				
Subject Description	**Subject Code**	**Subject Title (Theory & Practical)**	**Credits**	**Continuous Internal Evaluation (CIE)**	**University Exam(UE)**		**Max. Marks**
					Theory	**Practical**	
Choose any Two Subjects (Core Course) on the Basis of Semester-II							
Physics	B010301T	ElectromagneticTheory&CommunicationSystems	04	25	75	--	100
	B010302P	DemonstrativeAspectsofElectricity&Magnetism	02	25	--	75	100
Chemistry	B020301T	Chemical Dynamics & Coordination Chemistry	04	25	75	--	100
	B020302P	Physical Analysis	02	25	--	75	100
Mathematics	B030301T	Algebra&MathematicalMethods	06	25	75	--	100
Botany	B040301T	Flowering Plants Identification & Aesthetic Characteristics	04	25	75	--	100
	B040302P	Plant Identification technology	02	25	--	75	100
Zoology	B050301T	Molecular Biology, Bioinstrumentation & Biotechniques	04	25	75	--	100
	B050302P	Bioinstrumentation & Molecular Biology Lab	02	25	--	75	100

Teacher Education Course							
Teacher Education Course **[TEC-3]**	E030301T	Psychological Foundations of Education [TEC-3]	**6**	**25**	**75**	**--**	**100**
Pedagogy (Vocational Course)							
Teacher Education Course **[PS-2]**	E030302T	Pedagogy of Sciences -2	**3**	**25**	**75**	**--**	**100**
Co-Curricular Course							
Co-Curricular Course **[CCC-3]**		Human Value And EEnvirolment studies	**2**	**25**	**75**	**--**	**100**
Industrial Training							
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2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class: **Diploma**	Year: **Second**	Semester: **Third**
Subject: **Physics**		
Course Code: **B010301T**	Course Title: **Electromagnetic Theory & Communication Systems**	
Objective: In this course student will be concerned with the disciplines of electromagnetic theory is basic to all other branches of physics. This course provides students with a working knowledge of optical physics, including diffraction and polarisation, laser physics.		
Credits: **4**	Core Compulsory / Elective	
Max. Marks: **25+75**	Min. Passing Marks:40	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: **4-0-0**		

Unit	Topics	No. of Lectures
	PART A **Electromagnetic Theory**	
I	**Electrostatics** Develop skills to understand the Electric charge & charge densities, electric force between two charges. General expression for Electric field in terms of volume charge density (divergence & curl of Electric field), general expression for Electric potential in terms of volume charge density and Gauss law (applications included). Study of electric dipole. Electric fields in matter, polarization, auxiliary field **D** (Electricdisplacement), electric susceptibility and permittivity.	8
II	**Magnetostatics** Electric current & current densities, magnetic force between two current elements. General expression for Magnetic field in terms of volume current density (divergence and curl of Magnetic field), General expression for Magnetic potential in terms of volume current density and Ampere's circuital law (applications included). Study of magnetic dipole (Gilbert & Ampere model).Develop skills to understand the Magnetic fields in matter, magnetization,auxiliaryfieldH,magneticsusceptibilityandpermeability.	8
III	**Time Varying Electromagnetic Fields** Faraday's laws of electromagnetic induction and Lenz's law. Displacement current, equation of continuity and Maxwell-Ampere's circuital law. Self and mutual induction (applications included).Develop skills to understand the	7

	DerivationandphysicalsignificanceofMaxwell'sequations and their employability.Theory and working of moving coilballistic galvanometer (applications included).	
IV	**Electromagnetic Waves** Electromagnetic energy density and Poynting vector. Plane electromagnetic waves in linear infinite dielectrics, homogeneous & inhomogeneous plane waves and dispersive & non-dispersive media. Reflection and refraction of homogeneous plane electromagnetic waves, law of reflection, Snell'slaw, Fresnel's formulae (only for normal incidence & optical frequencies) and Stoke's law.	7
	PART B **Communication Systems & Introduction to Fiber Optics**	
V	**Communication System** Introduction and Block diagram. Components of Communication System - amplifier,transmitter, channel receiver and band spectrum modulation. Types of modulation, modulation factor & its importance. Forms of modulation.	7
VI	**Basics of Amplitude Modulation** Modulation-index,frequencyspectrum,generationofAM(balancedmodulator,collector modulator). Amplitude Demodulation (diode detector), Double Side Band Suppressed Carrier (DSBSC) generation, Single Side Band Suppressed Carrier (SSBSC) generation.	8
VII	**Introduction to Angle Modulation** General Frequency & Phase modulation, frequency spectrum, bandwidth requirement, Frequency & Phase Deviation, Modulation index, equivalence between FM & PM, Generation of FM and FM detector.	7
VIII	**Introduction to Fiber Optics** Basics of Fiber Optics, step index fiber, graded index fiber, light propagation through anoptical fiber, acceptance angle & numerical aperture, intermodal dispersion losses and applications of optical fibers.	8

Course Outcomes (COs)

CO1: Develop skills forBetter understanding of electrical and magnetic phenomenon in daily life.

CO2: To troubleshoot simple problems related to electrical devices.

CO3: Comprehend the powerful applications of ballistic galvano meter.

CO4: Develop skills forStudy the fundamental physics behin dreflection and refraction flight (electro magnetic waves).

CO5: Study the working and applications of Michelson and Fabry-Perotinterferometers.

CO6: Recognize the difference between Fresnel's and Fraunh ofer'sclass of diffraction.

CO7: Comprehend the use of polarimeters.

CO8: Develop skills forStudythe characteristics and uses of lasers.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2				2			
CO 2		3				2		
CO 3			2			2		
CO 4			3	2				
CO 5			2		2	3		
CO 6			3			1		
CO 7					1	1		
CO 8					1	2		

CO- Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2		
CO2	1		
CO3	2		
CO4	1		
CO5	2		

CO6	1		
CO7	2		
CO8	1		

Suggested Readings

PART A

1. D.J. Griffiths, "Introduction to Electrodynamics", Prentice-Hall of India Private Limited, 2002,3e
2. E.M. Purcell, "Electricity and Magnetism (In SI Units): Berkeley Physics Course Vol 2", McGraw Hill, 2017, 2e
3. Richard P. Feynman, Robert B. Leighton, Matthew Sands, "The Feynman Lectures on Physics - Vol. 2", Pearson Education Limited,2012
4. D.C. Tayal, "Electricity and Magnetism", Himalaya Publishing House Pvt. Ltd., 2019,4e

PART B

1. M.S. Roden, "Analog and Digital Communication Systems", Discovery Press, 2003,5e
2. D. Roddy, J. Coolen, "Electronic Communications", Pearson Education Limited, 2008,4e
3. Jeffrey S. Beasley, Gary M. Miller, "Modern Electronic Communication", Pearson Education Limited, 2007,9e
4. W. Schweber, "Electronic Communication Systems: A Complete Course", Pearson Education Limited, 2001,4e
5. John M. Senior, "Optical Fiber Communications: Principles and Practice", Pearson Education Limited, 2010,3e
6. John Wilson, John Hawkes, "Optoelectronics: Principles and Practice", Pearson Education Limited, 2018,3e

Course Books published in Hindi may be prescribed by the Universities.

Suggestive Digital Platforms / Web Links

1. MIT Open Learning - Massachusetts Institute of Technology,https://openlearning.mit.edu/
2. National Programme on Technology Enhanced Learning (NPTEL),https://www.youtube.com/user/nptelhrd
3. Uttar Pradesh Higher Education Digital Library,http://heecontent.upsdc.gov.in/SearchContent.aspx
4. Swayam Prabha - DTH Channel,https://www.swayamprabha.gov.in/index.php/program/current_he/8

This course can be opted as an Elective by the students of following subjects

Open to all

Course Prerequisites

Passed Semester I, Theory Paper-1 (B010101T)

Suggested Equivalent Online Courses

1. Coursera,https://www.coursera.org/browse/physical-science-and-engineering/physics-and-astronomy

2. edX,https://www.edx.org/course/subject/physics
3. MIT Open Course Ware - Massachusetts Institute of Technology,https://ocw.mit.edu/courses/physics/
4. Swayam - Government of India,https://swayam.gov.in/explorer?category=Physics
5. National Programme on Technology Enhanced Learning (NPTEL),https://nptel.ac.in/course.html

Further Suggestions

- In End-Semester University Examinations, equal weightage should be given to Part A (units I to IV) andPart B (units V to VIII) while framing the questions.

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course II
(Practical)

Programme/Class: **Diploma**	Year: **Second**	Semester: **Third**
Subject: **Physics**		
Course Code: **B010302P**	Course Title: **Demonstrative Aspects of Electricity & Magnetism**	
Objective: The main goal of this subject is to share the knowledge to the students about the Experiments. The students will get a better understanding of the concepts studied by them in the theory course and correlate with experimental observations.		
Credits: **2**	Core Compulsory / Elective	
Max. Marks: **25+75**	Min. Passing Marks:40	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: **0-0-4**		

Unit	Topics	No. of Lectures
	Lab Experiment List	60
	1. Develop skills to understand theVariation of magnetic field along the axis of singlecoil 2. Variation of magnetic field along the axis of Helmholtzcoil 3. Ballistic Galvanometer: Ballistic constant, current sensitivity and voltagesensitivity 4. Develop skills to understand theBallistic Galvanometer: High resistance by Leakagemethod 5. Ballistic Galvanometer: Low resistance by Kelvin's double bridgemethod 6. Ballistic Galvanometer: Self inductance of a coil by Rayleigh'smethod 7. Ballistic Galvanometer: Comparison ofcapacitances 8. Develop skills to understand theCarey Foster Bridge: Resistance per unit length and lowresistance 9. Deflection and Vibration Magnetometer: Magnetic moment of a magnet and horizontal component of earth's magneticfield 10. Earth Inductor: Horizontal component of earth's magneticfield	
	Online Virtual Lab Experiment List / Link	

Virtual Labs at Amrita Vishwa Vidyapeetham
https://vlab.amrita.edu/?sub=1&brch=192

1. Tangent galvanometer
2. Magnetic field along the axis of a circular coil carryingcurrent
3. Develop skills to understand theDeflectionmagnetometer
4. Van de Graaffgenerator
5. Barkhauseneffect
6. Develop skills to understand theTemperature coefficient ofresistance
7. Anderson'sbridge
8. Quincke'smethod

Course Outcomes (COs)

CO1:Experimental physics has the most striking impact on the industry wherever the instrument sareused to determine the electric and magnetic properties.
CO2: Develop skills to understand theMeasurement precision and perfection is achieved through Lab Experiments.
CO3: Online Virtual Lab Experiments give an insight in simulation techniques and provide a basis for modeling.

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1							2	
CO 2					2	2	3	1
CO 3					3		2	

CO- Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	1	2	3
CO2	2	2	3
CO3	3	2	3

Suggested Readings

1. B.L. Worsnop, H.T. Flint, “Advanced Practical Physics for Students”, Methuen & Co., Ltd., London, 1962,9e
2. S. Panigrahi, B. Mallick, “Engineering Practical Physics”, Cengage Learning India Pvt. Ltd., 2015,1e
3. S.L. Gupta, V. Kumar, “Practical Physics”, Pragati Prakashan, Meerut, 2014,2e

Course Books published in Hindi may be prescribed by the Universities.

Suggestive Digital Platforms / Web Links
1. Virtual Labs at Amrita Vishwa Vidyapeetham, https://vlab.amrita.edu/?sub=1&brch=192 2. Digital platforms of other virtuallabs
This course can be opted as an Elective by the students of following subjects
Botany / Chemistry / Computer Science / Mathematics / Statistics / Zoology
Course Prerequisites
Opted / Passed Semester III, Theory Paper-1 (B010301T)
Suggested Equivalent Online Courses
Further Suggestions
• The institution may add / modify / change the experiments of the same standard in thesubject. • The institution may suggest a minimum number of experiments (say 6) to be performed by each student per semester from the Lab ExperimentList. • Theinstitutionmaysuggestaminimumnumberofexperiments(say3)tobeperformedbyeachstudent persemester from the Online Virtual Lab Experiment List / Link.

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme: **BSc BEd**	**Year: Two**	**Semester: III**
Subject: **Chemistry**		
Course Code:**B020301T**	Course Title: **Chemical Dynamics & Coordination Chemistry**	

Objectives: The main objectives of this course is to develop the skills to learnthe characteristic of the thre states of matter and describe the different physical properties of each state of matter. Kinetic theory of gase laws of crystallography, liquid state and liquid crystals, conductometric, potentiometric, optical method polarimetry and spectrophotometer technique to study Chemical kinetics and chemical equilibrium an development of employability and entrepreneurship.

Credits: 4	**Elective**
Max. Marks: 25+75	Min. Passing Marks:40

Total No. of Lectures = 60

Unit	Topics	No. of Lectures
I	**ChemicalKinetics:**Rateofareaction,molecularityandorderofreaction,concentrationdependence of rates, mathematical characteristic of simple chemical reactions – zero order, first order, second order, pseudo order, half-life and mean life. Determination of the order of reaction – differential method,methodofintegration,half-lifemethodandisolationmethod.Briefoutlineofexperimental methods of studying chemical kinetics: Conductometric, potentiometric, optical methods, polarimetry andspectrophotometer **Theories of chemical kinetics:** Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant andthermodynamic aspects (no derivation).	10

II	Chem**ical Equilibrium:** Equilibrium constant and free energy, hermodynamic derivation of law ofmassaction.Le-Chatelier'sprinciple. Reactionisothermandreactionisochore–Clapeyron- Clausius equation and its applications.	5
III	**PhaseEquilibrium**:Statementandmeaningoftheterms-phase,componentanddegreeoffreedom, derivation of Gibbs phase rule, phase equilibria of one component system– water, CO_2 andsystems. Phase equilibria of two component systems – Solid - liquid equilibria, simple eutectic – Bi-Cd,Pb-Ag systems.	05
IV	**Kinetic theories of gases** **Gaseous State:** Postulates of kinetic theory of gases, deviation from ideal behavior, van der Waals equation of state. **Critical phenomena**: PV isotherms of real gases, continuity of states, the isotherms of Van der Waals equation, relationship between critical constants and Van der Waals constants, the law of corresponding states, reduced equation of state. **Molecular Velocities**: Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquefaction of gases (based on Joule- Thomson effect).	10
V	**Liquid State:** Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases. Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholesterol phases. Thermography and seven segment cell. **Liquids in solids (gels)**: Classification, preparation and properties, inhibition, general application	5
VI	**CoordinationChemistry** Coordinate bonding: double and complex salts. Werner's theory of coordination complexes, classificationofligands,ambidentateligands,chelates,coordinationnumbers,IUPACnomenclature of coordination complexes (up to two metal centers), Isomerism in coordination compounds, constitutional and stereo isomerism, geometrical and optical isomerism in square planarand octahedral complexes.Application of coordination chemistry in development employability in research and development and at industrial level.	5
VII	**Theories of Coordination Chemistry** **I** Metal- ligand bonding in transition metal complexes, limitations of valance bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planner complexes, factors affecting the crystal-field parameters.	10

	II. Thermodynamic and kinetic aspects of metal complexes: A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, stability constants of complexes and their determination, substitution reactions of square planar complexes	
VIII	**Inorganic Spectroscopy and Magnetism** I)Electronic spectra of Transition Metal ComplexesTypes of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemicalseries,Orgel-energyleveldiagramford1andd9states,discussionoftheelectronicspectrum of $[Ti(H_2O)_6]^{3+}$ complex ion. II)Magnetic properties of transition metal complexes, types of magnetic behaviour, methods of determining skill development for magnetic susceptibility, spin-only formula, L-S coupling, correlation of μ s and μ eff values,orbitalcontributiontomagneticmoments,applicationofmagneticmomentdatafor3d-metal complexes. Physical properties and molecular structure : Optical activity, polarization – (Clausius - Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment-temperature method and refractivity method, dipole moment and structure of molecules, magnetic properties paramagnetism, diamagnetism and ferromagnetism, magnetic susceptibility, its measurements and its importance.	10

Course outcomes:

CO1:Evaluaterate constant of are actionas wellas understand theories of reactionrates.
CO2:Understand the concept to fequilibrium constant and freeenergy.
CO3: Development of skills to Learn the concept to of phases, component and degree of freedom and its applications to various phasediagrams
CO4:Understand the conceptof kinetic theory of gases and behaviorofrealgases.
CO5:Understand the basic concepts of liquid state and liquid crystals.
CO6: Skill development in learning about coordination compounds of transition metal complexes and their applications.
CO7: Describe metal-li and bonding, thermo dynamic and kinetic aspects of metal complexes.
CO8: Explain the electronic spectraand magnetic behavior of transitionmetal complexes

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): (Please write 3,2,1 wherever required)

Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	3	2	2	2	3
CO2	3	2	2	3	2	2	2	2
CO3	3	1	2	3	2	2	2	2
CO4	3	2	3	3	2	2	2	2
CO5	3	2	3	3	2	2	2	2
CO6	3	3	2	3	1	3	2	2
CO7	3	3	2	3	3	1	2	2
CO8	3	3	2	3	1	3	2	2

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship
CO1	3	2	1
CO2	3	2	2
CO3	3	2	2
CO4	3	3	2
CO5	3	2	1
CO6	3	2	2
CO7	3	2	2
CO8	3	3	1

Suggested Readings:

1. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry Ed., Oxford University Press 13(2006).
2. Ball, D. W. Physical Chemistry Thomson Press, India(2007).
3. Castellan, G. W. Physical Chemistry 4th Ed. Narosa(2004).
4. Cotton,F.A, Wilkinson,G and Gaus,P. L ,Basic Inorganic Chemistry,3rd Edition ,Wiley1995
5. Lee,J.D, Concise Inorganic Chemistry 4th EditionELBS,1977

6. Douglas,B, McDaniel ,D and Alexander,J ,Concepts of Models of Inorganic Chemistry, John Wiley &Sons; 3rd edition ,1994
7. Shriver,D.E Atkins,P.W and Langford,C .H , Inorganic Chemistry ,Oxford University Press,1994.
8. Porterfield,W.W, Inorganic Chemistry,Addison Wesley1984.
9. Sharpe,A .G, Inorganic Chemistry, ELBS,3RD edition,1993
10. Miessler,G.L,Tarr,D.A, Inorganic Chemistry, 2nd edition , PrenticeHall,2001

Note: For the promotion of Hindi language, course books published in Hindi may be prescribed by the University

Suggestive digital platforms web links- Suggestive digital platforms web links:

1. https://swayam.gov.in/
2. https://www.coursera.org/learn/physical-chemistry
3. https://www.mooc-list.com/tags/physical-chemistry
4. https://www.openlearning.com/courses/introduction-to-physical-chemistry/
5. https://www.my-mooc.com/en/categorie/chemistry
6. https://onlinecourses.swayam2.ac.in/nce19_sc15/preview
7. https://swayam.gov.in/

https://www.coursera.org/browse/physical-science-and-engineering/chemistry

This course can be opted as an elective by the students of following subjects: Chemistry in 12 th Class

Suggested Continuous Evaluation Methods: Students can be evaluated on the basis of score obtained in a mid-term exam, together with the performance of other activities which can include short exams, in-class or on-line tests, home assignments, group discussions or oral presentations, among others .

Or

Course prerequisites: To study this course, a student must have had the chemistry in class 12 th , Physics in Class 12th

Suggested equivalent online courses:……..

Further Suggestions:……..

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course II
(Practical)

PROGRAMME/ CLASS **DIPLOMA/ BSc BEd**	BSc BEd- **2 YEAR**	SEMESTER : **III**
Subject:**Chemistry**		
COURSE CODE:**B020302P**	COURSE TITTLE:**Physical Analysis**	

Objectives: The primary objective of this course is to develop skill to make students aware ofapparatus calibration, solution preparation, estimation by through volumetric analysis and analysis of phase equilibrium.

CREDITS: **2**	MAX.MARKS: **25+75**	MIN.PASSING MARKS: 40

Total No. of Lectures- Tutorials-Practical(in hours per week): **60h**

Unit	Topic	No.of Lectures
I	**Strengths of Solution** Calibrationoffractionalweights,pipettesandburettes.Preparationofstandardssolutions.Dilution– 0.1 M to 0.001 M solutions.Mole Concept and Concentration Units :Mole Concept, molecular weight, formula weight, and equivalent weight. Concentration units: Molarity, Formality, Normality, Molality, Mole fraction, Percent by weight, Percent by volume, Parts per thousand, Parts per million, Parts per billion, pH, pOH, milli equivalents, Milli moles	20
II	**Surface Tension and Viscosity** 1. Determination of surface tension of pure liquid orsolution 2. Determination of viscosity of liquid pure liquid orsolution	6
III	**Boiling point and Transition Temperature** 1. Boilingpointofcommonorganicliquidcompounds*n*butylalcohol,cyclohexanol, ethyl methyl ketone, cyclohexanone, acetylacetone, isobutyl methyl ketone, isobutyl alcohol, acetonitrile,benzaldehydeandacetophenone.[Boilingpointsofthechosenorganiccompounds should preferably be within180^{0}C]. **2.** Transition Temperature, Determination of the transition temperature of the given substancebythermometric /dialometric method (e.g. $MnCl_2.4H_2O$/$SrBr_2.2H_2O$)	14
IV	**Phase Equilibrium** 1. To study the effect of a solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquids	20

	(e.g. phenolwater system) and to determine the concentration of that solute in the given phenol-watersystem To construct the phase diagram of two component (e.g. diphenylamine – benzophenone)system by cooling curve method. Role of phase equilibrium in development of employability in research and development and at industrial level.	

Course Outcomes:

CO1:Calibrate apparatus and preparesolutions of variouscon centrations.

CO2:Determine surface tension and viscosityof any solution.

CO3: Development of skills to performdila to metric experiments for a givensubstance.

CO4:Analyze component and phaseina equilibrium

Suggested Readings:

1. Skoog .D.A., West.D.M and Holler .F.J., "Analytical Chemistry: An Introduction", 7th edition, Saunders college publishing,Philadelphia,(2010).
2. Larry Hargis.G" Analytical Chemistry: Principles and Techniques" Pearson©(1988)

Note: For the promotion of Hindi language, course books published in Hindi may be prescribed by the University

Suggestive digital platforms web links

1. https://www.labster.com/chemistry-virtual-labs/
2. https://www.vlab.co.in/broad-area-chemical-sciences
1. **http://chemcollective.org/vlabs**

This course can be opted as an elective by the students of following subjects: Chemistry in 12th Class

Course prerequisites: To study this course, a student must have Opted Sem-III, Theory Ppaer-1

Suggested equivalent online courses:……..

Further Suggestions:……..

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class **Diploma/ BSc BEd**	Year: **Second**	Semester: **III**
Subject:**Mathematics**		
CourseCode:**B030301T**	CourseTitle:**Algebra&MathematicalMethods**	

Objective: - The main aims of this course abstract algebra are to provide a first approach to the subject of algebra, which is one of the basic pillars of modern and applied mathematics. The focus of the subject will be the study of certain structures called groups, rings, fields, field extensions, ideals and some related structures. To describe Laplace Transforms, the ideas of Fourier and indicate their applications in the fields such as application of PDE, theory of wave equations, differential equations and many others for better employability in industry.

Credits:**6**	Core Company
Max Marks:**25+75**	Min passing Marks:40

Total No of Lectures – Tutorial –Practical (in hours per week): **L-T-P 6-0-0**

UNIT	TOPICS	NO OF LECTURE
	Part- AAlgebra	
I	Equivalencerelationsandpartitions,Congruencemodulon,Definitionofagroupwithexamplesandsimpleproperties,Subgroups,Generatorsof agroup,Cyclic groups for skill development.	12
II	Permutationgroups,Evenandoddpermutations,Thealternatinggroup,Cayley'stheorem, Directproducts,Cosetdecomposition,Lagrange's theoremanditsconsequences,FermatandEuler theorems for skill development.	11
III	Normalsubgroups,Quotientgroups,Homomorphismandisomorphism,Fundamentaltheoremofhomomorphism,Theoremsonisomorphismfor skill development.	11
IV	Rings,Subrings,Integraldomainsandfields,Characteristicofaring,Idealandquotientrings,Ringhomomorphism,Fieldofquotientofanintegraldomain for skill development.	11
	Part-BMathematicalMethods	
V	LimitandContinuityoffunctionsoftwovariables,Differentiationoffunctionoftwovariables,Necessaryandsufficientconditionfordifferentiabilityoffunctionstwovariables,Schwarz'sandYoungtheorem,Taylor'stheoremforfunctionsoftwovariableswithexamples,Maximaandminimaforfunctionsoftwovariables,Lagrangemultipliermethod,Jacobiansto	12

	provide skills.	
VI	ExistencetheoremsforLaplacetransforms,LinearityofLaplacetransformandtheirproperties,Laplacetransformofthederivativesandintegralsofafunction,Convolutiontheorem,inverseLaplacetransforms,SolutionofthedifferentialequationsusingLaplacetransformsfor skill development.	11
VII	Fourierseries,Fourierexpansionofpiecewisemonotonicfunctions,Halfandfullrangeexpansions,Fouriertransforms(finiteandinfinite),Fourierintegralto provide skills.	11
VIII	Calculusofvariations-Variationalproblemswithfixedboundaries-Euler'sequationfor functional containingfirstorderderivativeand one independent variableto provide skill, Extremals, Functionals dependent on higher order derivatives, Functionals dependent on more than oneindependent variable,Variationalproblemsinparametric form. **Thetopic"IndianAncientMathematicsand MathematiciansshouldbecoveredunderContinuousInternalEvaluation(CIE).**	11

Courseoutcomes:

CO1: Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of Group, Ring theory and their properties.

CO2 :A student learning this course gets a concept of Group, Ring, Integral Domain and their properties. These courses willed the student to basic course in advanced mathematics and Algebra.

CO3: The course gives emphasis to enhance students knowledge of functions of two variables, Laplace Transforms, Fourier Series.

CO4: On successful completion of the course students should have knowledge about higher different mathematical method sand will help him in going for higher studies and research willalso get knowledge for better employability in industry.

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs):(Please write 3,2,1 wherever required)

Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	3	3	3	2
CO2	2	3	1	1	3	2	2	3
CO3	1	1	3	3	2	2	1	1
CO4	3	2	3	2	3	3	3	2

CO- Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	Skill Development	Employability	Entrepreneurship
CO1	3	1	1
CO2	3	1	1
CO3	3	2	1
CO4	3	2	1

SuggestedReadings(Part-AAlgebra):

1. J.B.Fraleigh,AfirstcourseinAbstractAlgebra,Addison-weley
2. I.N.Herstein,TopicsinAlgebra,JohnWiley&Sons
3. Suggesteddigitalplateform:NPTEL/SWAYAM/MOOCS
4. CourseBooks(text/reference)publishedinHindimaybeprescribedbytheUniversitiesatlocallevels.

SuggestedReadings(Part-BMathematicalMethods):

1. T.M.Apostal,MathematicalAnalysis,Person
2. G.F.Simmons,DifferentialEquationswithApplicationandHistoricalNotes,Tata–Mc Graw Hill
3. ErwinKreyszig,AdvancedEngineeringMathematics,JohnWiley&Sons.
4. Suggesteddigitalplatform: NPTEL/SWAYAM/MOOCs

CourseBooks (text/reference)publishedinHindimaybeprescribedbytheUniversitiesatlocallevels.

Thiscoursecanbeoptedasanelectivebythestudentsoffollowingsubjects:Engg.andTech.(UG),B.Sc.(C.S.)
Courseprerequisites:Tostudythiscourse, astudentmusthavesubjectMathematicsinclass 12th
Suggestedequivalentonlinecourses:
FurtherSuggestions:

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class: **DIPLOMA/ BSc BEd**	Year: **SECOND**	Semester: **THIRD**
Subject:**Botany**		
CourseCode:-**B040301T**	CourseTitle:**Flowering Plants Identification & Aesthetic Characteristics**	

Objective: The objective of this course is to enchance the knowledge of the students about the flowering plants, their classification and nomenclature. This course also aims to study the role of BSI, Herbarium, Botanical gardens in modern plant taxonomy for skill development.

Credits: **04**	**CoreCompulsory**
Max.Marks: **25+75**	Min.Pass Marks: **40**

TotalNo.of Lectures-Tutorials-Practical(inhoursperweek):4-**0**-**0**.

Unit	Topic	No. of Lectures
I	**Taxonomic Resources & Nomenclature** Components of taxonomy (identification, nomenclature, classification) ; Taxonomic resources: Herbarium- functions& important herbaria, Botanical gardens, Flora, Keys- single access and multi-access. Botanical Nomenclature- Principles and rules of ICN (ranks and names; principle of priority, binomial system; type method, author citation, valid-publication) for skill development.	7
II	**Types of classification & Evidences** Artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series) angiosperm phylogeny group (APG III) classification. Taxonomic evidences from palynology, cytology, phytochemistry &Molecular biology data (Protein and Nucleic acid homology) for skill development.	8
III	**Identification of Angiospermic families -I: (Families can be chosen University wise as per local available flora)** A study of the following families with emphasis on the morphological peculiarities and economic importance of its members (based on Bentham & Hooker's system) -- Ranunculaceae, Malvaceae, Rutaceae, Fabaceae, Myrtaceae, Cucurbitaceae, Rubiaceae Asteraceae, Apocynacea, Acanthaceae, Asclepiadiaceae, Solanaceae for skill development.	8
IV	**Identification of Angiospermic families -II: (Families can be chosen University wise as per local available flora)** A study of the following families with emphasis on the morphological peculiarities and economic importance of its members (based on Bentham & Hooker's system)- Amaranthaceae, Euphorbiaceae, Papaveraceae, Scrophulariaceae, Orchidaceae, Liliaceae Arecaceae, Poaceae for skill development.	7

V	**Modern trends in Plant taxonomy**: Phenetics and Cladistics: Brief idea on Phenetics, Numerical taxonomy- methods, Operational Taxonomic Units, Cladistics- construction of dendrogram and primary analysis; Monophyletic, polyphyletic and paraphyletic groups; Plesiomorphy and apomorphy for skill development.	8
VI	**TOOLS & SOFTWARES IN PLANT IDENTIFICATION-** GIS (Mapping of (i) Patterns(ii) Features (iii) Quantities 0P02.010H11YLIP - Free Phylogenetic Software, Digital Taxonomy, DEscription Language for TAxonomy – DELTA Internet directory for botany for skill development.	7
VII	**Computer Applications** Introduction to Computers – classification, computer generation, low, medium and high level languages, software and hardware, operating systems, compilers and interpreters, personal, mini, main frame and super computers, characteristics and application, computer memory and its types, data representation and storage. Microsoft excel, data entry, graphs, aggregate functions, formulas and functions, number systems, conversion devices, secondary storage media for skill development.	7
VIII	**Aesthetic Characteristics of Plants:** Aesthetic characteristics of plants, English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Trees, shrubs and shrubberies, climbers and creepers, rockery, Flower beds, Shrubbery, Borders, Water garden). Some Famous gardens of India. Conservatory, greenhouses, Indoor garden, Roof garden, Topiary, Bonsai for skill development.	11

Course Outcomes:

Aftercompletingthiscourse, thestudents willbe able to:

CO1:To gainan understanding of the history and concepts underlying various approaches to plant taxonomy and classification for skill development.

CO2: To learn the major patterns of diversity among plants, and the characters and types of data used to classifyplants for skill development.

CO3: To compare the different approaches to classification with regard to the analysis ofdata for skill development.

CO4: To become familiar with major taxa and their identifying characteristics, and to develop in depth knowledge ofthe current taxonomy of a major plant family for skill development.

CO5: What are different methods of collecting and preserving plants? What is the importance of maintaining plants in botanic gardens for skill development?

CO6: Comparison among different flowering plants groups for skill development.

CO7: To discover and use diverse taxonomic resources, reference materials, herbarium collections, publications for skill development.

CO8: For the entrepreneur career in plants, one can establish a nursery, Start a landscaping business, Set up a farm Or Run a plantation consultancyfirm for skill development.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	1	1	1	1	1
CO2	1	1	2	1	2	1	2	2
CO3	2	2	1	1	2	3	1	1
CO4	3	2	1	2	1	1	1	2
CO5	3	3	2	1	3	2	3	3
CO6	3	2	1	1	1	1	1	1
CO7	2	2	1	2	2	2	2	2
CO8	1	1	1	1	1	1	3	1

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)

Please write 3,2,1 wherever required)

Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

SuggestedReadings:

1. Propagation And Nursery Management (hindi) (hb) ISBN : 9788177546200Edition : 01Year : 2016Author : Pandey
2. S.K. , Soni N.Publisher : Agrobios (India)
3. Dr. Amar Singh. □□□□□□□□□□□- Plant Taxonomy (An Old and Rare Book) from the category Ayurveda in our Books collection. Uttar Pradesh Hindi Sansthan, Lucknow
4. Bole, P. V. and Vaghani, Y. (1986) Field guide to the common trees of India. Oxford University Press;Bombay.
5. Brandis, D. (1906) Indian Trees (London, 5th edition. 1971). International Book Distributors; DehraDun.
6. Dallwitz, M. J., Paine, T. A. and Zurcher, E. J. (2003). Principles of interactive keys.http://delta-intkey.com
7. https://www.naace.co.uk/school-improvement/ict-mark/
8. https://www.socitm.gov.uk,(2002)Learninginthe21stcenturyExecutivebriefingASocitmInsightpublication,July 2002 Socitm.
9. K. B. Anjaria, (2015)"Electronic Herbarium and Digital Database Preparation of

Common Trees of Anand District, Gujarat" MRP submitted to UGC, WRO, Pune 2015(unpublished)
10. Lizeron Eremias and R. Subash.(2013) "E-Content Development: A Milestone In The Dynamic Progress Of E-Learning"InternationalJournalofTeacherEducationalResearch(IJTER)Vol.2No.1January,2013ISSN:2319-4642
11. Pandey,B.P.2007.BotanyforDegreeStudents:DiversityofSeedPlantsandtheirSystematics,Structure,Development and Reproduction in Flowering Plants. S. Chand & Company Ltd,NewDelhi.
12. Stace, C. A. 1989. Plant Taxonomy and Biostatistics (2nd Ed.). Edward Arnold,London.
13. Singh, G. 1999. Plant Systematics: Theory and Practice. Oxford and IBH, NewDelhi.
14. Dutta A.C. 2016. Botany for Degree Students. Oxford UniversityPress.
15. Davis, P. H. and V. H. Heywood. 1963. Principles of Angiosperm Taxonomy. Oliver andBoyd,London.
16. Heywood, V. H. and D. M. Moore (Eds). 1984. Current Concepts in Plant Taxonomy. Academic Press,London.
17. Austin, R. 2002. Elements of planting design. New York: John Wiley &Sons.
18. Bertauski, T. 2005. Designing the landscape: An introductory guide for the landscape designer. Upper Saddle River,NJ: Pearson PrenticeHall.
19. Thomas, H., and S. Wooster. 2008. The complete planting design course: Plans and styles for every garden.London: Octopus PublishingGroup.
20. Scarfone, S. 2007. Professional planting design: An architectural and horticultural approach for creating mixedbed plantings. New York: John Wiley &Sons.
21. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. AlliedPublishers.

This course can be opted as an elective by the students of following subjects: **Open to all but special for** B.Sc. Biotech, B.Sc. Forestry, B.Sc. Agriculture, B. Pharma, B.A. (Curators), B.A. Archaeology, B.A. Geology, BAMS

Suggested Continuous Evaluation Methods:

Continuous Internal Evaluation shall be based on allotted Assignment and Class Tests. The marks shall be as follows

Course prerequisites:

Qualification: Tostudythiscourse,astudent musthavequalified10+2withBiology/NSQFlevel3fromSectorSkill Councils / Diploma holder from ITI in (Biology/ Agriculture/Forestry).

Facilities: Smart and Interactive Class

Other Requisites: : Video collection, Books, CDs, Flora, Herbarium, Access to On-line resources, Display Charts

Suggested equivalent online courses: https://www.easybiologyclass.com/topic-botany/http://egyankosh.ac.in/handle/123456789/53530
https://www.delta-intkey.com/www/desc.htm
https://milneorchid.weebly.com/plant-id-for-beginners.htmlhttps://plants.usda.gov/classification.html
https://www.senecahs.org/pages/uploaded_files/Plant%20Classification.pdf
https://www.ladykeanecollege.edu.in/files/userfiles/file/Dr_%20S_%20Nongbri%20III%20Sem%20ppt.pdfhttps://www.brainkart.com/article/Bentham-and-Hooker-s-classification-of-plants---Dicotyledonae,-Gymnospermae-and-Monocotyledonae_1000/
https://libguides.rutgers.edu/c.php?g=336690&p=2267037https://www.delta-intkey.com/

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course II
(Practical)

Programme/Class: **Diploma/ BSc BEd**	Year: **Second**	Semester: **Third**
Subject:**Botany**		
Course Code: **B040302P**	Course Title: **Plant Identification technology**	

Course Learning outcomes:

Objective: The course aims to share the knowledge to the students about the experiments. The student will get a better understanding of the concept studies by them in theory course and correlation with experimental observations to provide emplotability and skill development.

Credits: **2**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**

Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-2**

Unit	Topics *(Perform Any three experiments from each unit as per facility)	No. of Lectures 60Hrs
I	**Herbarium: Plant collecting, Preservation and Documentation:** Stepwise Practicing Herbarium techniques: a. FIELD EQUIPMENTS, Global Positioning System (GPS) instrument & Collection of any wild 25 plant specimens b.Learn to handle Herbarium making tools c. Pressing and Drying of collected plant specimens d. Special treatments for all varied groups of plants e. Mount on standard herbarium sheets f. Label theusing Standard method g. Organize them and give Index Register Number to provide emplotability and skill development.	7
II	**Taxonomic Identification using plant structure** a. Classify 25 plants on the basis of Taxonomic description (Plant Morphology, Anatomy, Reproductive parts, Habit, adaptation anomalies) according to Benthum Hooker system of classification in the following families: Malvaceae, Fabaceae (Papilionaceae), Solanaceae, Scrophulariaceae, Acanthaceae, Labiatae (Lamiaceae), Rubiaceae to provide emplotability and skill development.	8
III	**Identification during excursions** a.Conducting Spot identification (Binomial, Family) of common wild plants from families included in the theoretical syllabus (list to be provided) and making FIELD NOTE BOOK and filling Sample of a page of field-book, used in Botanical Survey of India. b. Describe/compare flowers in semi-technical language giving V.S. of flowers, T.S. of ovaries, floral diagrams and Floral Formulae. Identify and assign them to their respective families giving reasons to provide emplotability and skill	8

	development.	
IV	**COLLECTION, PRESERVATION AND STORAGE OF ALGAE,FUNGI BRYOPHYTES,PTERIDOPHYTES (Two each)** to provide emplotability and skill development.	7
V	**Botanical Nomenclature & reporting Method:** **a.** Give nomenclature to collected plants as per ICN rules and prepare labels as perBSI **Author Citation, Effective Publication and Principle of Priority:** To show a specimen paper on Basic structure of a taxonomic Research published on a new species in taxonomic journal to provide emplotability and skill development.	7
VI	**COMPUTERS** 1. Learning to use EXCEL Microsoft PowerPoint and Word., WORKING WITH FOLDER AND WINDOWS UTILITY., CREATE ANDMANAGE FILES AND FOLDERTREE, 2. Practice browsing of different sites using search engine. practice and understand different E-Mail services – Outlook, Yahoo mail, rediffmail etc. Practice Creating E-Mail accounts, Sending, Receiving & Storing ofmails. 3. Create and Participate in virtual conferencing in an interactiveZoom Meeting to provide emplotability and skill development.	7
VII	**Computer Application in taxonomy** 1. Use Taxonomic Softwares (Dichotomous Key) 2. Practicals on Phylogenetic analysis. 3. Make line drawing of Plants for description 4. Using of plant identification apps on androidphones	8
VIII	1. Create a Bonsai of anyplant 2. Develop a miniature garden 3. Draw Layouts of various types ofgardens Plant Propagation methodspractice to provide emplotability and skill development.	8

Course Outcomes:

After the completion of the course the students will be able:

CO1: To learn how plant specimens are collected, documented, and curated for a permanentrecord for emplotability and skill development.

CO2: To observe, record, and employ plant morphological variation and the accompanying descriptive terminology for emplotability and skill development.

CO3: To gain experience with the various tools and means available to identifyplants for emplotability and skill development.

CO4: To develop observational skills and fieldexperience for emplotability and skill development.

CO5: To identify a taxonomically diverse array of nativeplants for emplotability and skill development.

CO6: To recognize common and major plantfamilies for emplotability and skill development.

CO7: To understand aesthetic characters of flowering plants by making-landscapes, gardens, bonsai, miniatures for emplotability and skill development.

CO8: Comprehend the concepts of plant taxonomy and classification ofAngiosperms.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	1	1	1	1	1
CO2	1	1	2	1	2	1	2	2
CO3	2	2	1	1	2	3	1	1
CO4	2	1	2	1	2	2	1	2
CO5	1	1	2	1	2	1	2	2
CO6	2	2	1	1	2	3	1	1
CO7	3	2	1	2	1	1	1	2
CO8								

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

Suggested Readings:

1. Day, S.C. (2003)Complete Home Gardening. (2003) Agrobias, Jodhpur,India.
2. Dhopte, A.M. (2003) Principles and Techniques for Plant Scientists. - Agrobios,Jodhpur,India.
3. Khan, M.R. (1995) Horticulture and Gardening.- NiraliPrakashan, Pune.India.
4. PramilaMehra Gardening for every one-. Hind pocket book private limited,NewDehli.
5. Kumarsen V. Horticulture ,SarasPublication
6. Ramesh Bangia Learning Computer Fundamentals.,., Khanna BookPublishers
7. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH PublishingCo., NewDelhi.
8. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore,Madras.
9. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. AlliedPublishers.
10. Bole, P. V. and Vaghani, Y. (1986) Field guide to the common trees of India. Oxford UniversityPress; Bombay.
11. Womersley, J. S. 1981. Plant collecting and herbarium development: Amanual.
12. Brandis, D. (1906) Indian Trees (London, 5th edition. 1971). International Book Distributors; DehraDun.
13. Dallwitz, M. J., Paine, T. A. and Zurcher, E. J. (2003). Principles of interactive keys.

http://delta-intkey.co https://www.naace.co.uk/school-improvement/ict-mark/
14. Manilal, K. S. and M. S. Muktesh Kumar (ed.) (1998) A Hand book of Taxonomy Training, DST,N.Delhi
15. Naik, V. N. (1984) Taxonomy of Angiosperms Tata McGrow-Hill Publication Com. Ltd., NewDelhi
16. Primak, R. B. (2004) A Primer of Conservation Biology. Sinauer Associales, Inc.Publishers
17. Quicke, Donald, L. J. (1993) Principles and Techniques of Commemoratory Taxonomy. Blakie,Academic and Professional,London
18. Singh, G (2004) Plant Systematics:Theory and practice Oxford and YBH Publishing Co. Pvt. Ltd., New Delhi.
19. Bridson, D. & L. Forman. eds. 1998. The Herbarium Handbook. 3rd ed. Royal Botanic Gardens,Kew (Reprinted1999).
20. De Vogel, E.F. 1987. Manual of Herbarium Taxonomy: Theory and Practice. UNESCO,Jakarta.
21. Fosberg, F.R. & M.-H. Sachet. 1965. Manual for tropical herbaria. Int. Bur. Pl. Tax. &Nom.,Regnum Vegetabile Vol. 39.Utrecht.
22. Jain, S.K. & R.R. Rao. 1977. A handbook of field and herbarium methods. Today & Tomorrow's Printers and Publishers, NewDelhi.
23. Victor, J.E., M. Koekemoer, L. Fish, S.J. Smithies, M. Mossmer. 2004. Herbarium essentials:theSouthern
24. African Herbarium user manual. Southern African Botanical Diversity Network Report No. 25. SABONET, Pretoria.

This course can be opted as an elective by the students of following subjects: **Open to all but special for** B.Sc. Biotech, B.Sc. Forestry, B.Sc. Agriculture, B. Pharma, B.A. (Curators), B.A. Archaeology, B.A. Geology, BAMS

Course prerequisites:

Qualification: To study this course, a student must have qualified 10+2 with Biology/ NSQF level 3 from Sector Skill Councils / Diploma holder from ITI in (Biology/ Agriculture/ Forestry).

Facilities: Smart and Interactive Class

Other Requisites: : Video collection, Books, CDs, Flora, Herbarium, Access to On-line resources, Display Charts

Lab Requisites: Microscopes (Compound, Stereo) Dissection box, stain, Herbarium, Herbarium press, Dryers, Grinder, Reference Flora.

Suggested equivalent online courses:

1. http://egyankosh.ac.in/bitstream/123456789/13096/1/Unit-5.pdf
2. https://www.for.gov.bc.ca/hfd/pubs/docs/wp/wp18.pdf
3. https://www.researchgate.net/publication/267510854_The_Flowering_Plants_Handbook

Any Other :

***Botanical Excursions*:** One teacher along with a batch not more than 7 students be taken for botanical excursion to places of Botanical interest, one in each term. If there are female students in a batch of 7 students, one additional lady teacher is permissible for excursion.

Each excursion will not be more than SEVEN days during college working days. T.A. and D.A. for teachers and non-teaching staff participating in excursions should be

paid as per rules. Tour report duly certified by tour in charge teacher and Head of the Department should be submitted at the time of practical examination. For every study tour take the prior permission of the head of the department and Principal.

The marks will be counted under Internal assessment and external assessment both.In external assessment student will have to present his excursion report along with industrial training/central labs visits and BSI or Museum visits.In internal assessment he shall have to label the campus plants with botanical details/develop herbal/floristic garden/conserve plants in botanical garden/contribute specimens via collection .

A project supported along with photographs taken during field study to be submitted giving comprehensive idea about different types of inflorescence, flowers and fruits/

At least three field excursions at hills/Oceans/Deserts including one Compulsory excursion to Botanical Garden, FRI/BSI and Central National Herbarium (CNH). Central Research Institutes/Hot Spots

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Teacher Education) Programme
Course I
(Theory)

Programme/Class: **Diploma/ BS BEd**	Year: **Second**	Semester: **Third**
Subject: **ZOOLOGY**		
Course Code: **B050301T**	Course Title:**Molecular Biology, Bioinstrumentation & Bio-techniques**	

Objective: To help the students to learn and develop an understanding of a molecular biology and a clear understanding of the processes of central dogma viz.transcription, translation *etc*. This course is designed to acquire the awareness about the different molecular techniques. This gives knowledge for better employability in industry.

Credits: **4**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**

Total No. of Lectures-Tutorials-Practical (in hours per week): **4-0-0**

Unit	Topics	No. of Lectures
I	**Process of Transcription** • Fine structure ofgene • RNApolymerases • Transcription factors andmachinery • Formation of initiationcomplex • Initiation, elongation and termination oftranscription in prokaryotes andeukaryotesfor understanding ofentrepreneurial skill.	7
II	**Process of Translation** • The Geneticcode • Ribosome • Factors involved intranslation • Aminoacylation of tRNA, tRNA-identity, aminoacyltRNA synthetase • Initiation, elongation and termination of translationin prokaryotes andeukaryotesto provide employability and skills.	7
III	**Regulation of Gene Expression I** • Regulation of gene expression in prokaryotes: *lac*and*trp* operons in *E. coli* • Regulation of gene expression in eukaryotes: Roleof chromatin in geneexpression • Regulation at transcriptional level,Post-transcriptional.	8
	modifications: Capping, Splicing, Polyadenylation RNA editing for skill developmentand employability. •	
IV	**Regulation of Gene Expression II**	10

	• Regulation of gene expression in eukaryotes: • Regulation at translational level, post-translational modifications: protein folding etc. • Intracellular protein degradation • Gene silencing, RNA interference (RNAi)employability in medical sectors.	
V	**Principle and Types of Microscopes** • Principle of Microscopy and Applications • Types of Microscopes: light microscopy, dark field microscopy, phase-contrast microscopy, Fluorescence microscopy, confocal microscopy, electron microscopy for skill development.	6
VI	**Centrifugation and Chromatography** • Principle of Centrifugation: • Types of Centrifuges: high speed and ultracentrifuge • Types of rotors: Vertical, Swing-out, Fixed-angle etc. • Principle and Types of Chromatography: paper, thin layer, column---ion-exchange, gel filtration, HPLC,Affinity for skill development and employability.	8
VII	**Spectrophotometry and Biochemical Techniques** • Colorimetry and spectrophotometry: Beer-lambert law, absorption spectrum • Biochemical techniques: Measurement of pH, Preparation of buffers and solutions • Measurement, applications and safety measures of radio-tracer techniques to provide employability and skills.	8
VIII	**Molecular Techniques** • Nucleic acid fractionation, detection by electrophoresis, DNA sequencing, Polymerase Chain Reaction (PCR), primer designing, DNA fingerprinting, site directed mutagenesis, RFLP • Molecular cloning, genomic libraries, Gene transfer techniques: electroporation, microinjection • Detection of proteins, PAGE, ELISA, Western blotting,Hybridoma technology employability in Research Labs.	8

Course Learning outcomes:

The student at the completion of the course will be able to have:

CO1: A detailed and conceptual understanding of molecular processes *viz.* DNA totrait better understanding of skill.

CO2: A clear understanding of the processes of central dogma *viz.* transcription, translation *etc.* underlying survival and propagation of life at molecularlevel for skill developmentand employability.

CO3: Understanding of how genes are ultimately expressed as proteins which are responsible for the structureand function of allorganisms to provide employability and skills.

CO4: Learn how four sequences (3 letter codons) generate the transcripts of life and determine the phenotypes oforganisms for skill development.

CO5: How genes are regulated differently at different time and place in prokaryotes andeukaryotes for
entrepreneurship.
CO6: To understand the basic principle of different types of Microscopes skilling of entrepreneurship.

CO7: To gain the knowledge of chromatography, spectrophotometry and Biochemical Techniques for employability.
CO8: To acquire the awareness about the different molecular techniquesfor understanding of

entrepreneurial skill.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	2	1	1	1	2	1
CO2	3	3	1	2	1	1	1	2
CO3	1	3	2	3	2	2	2	1
CO4	2	2	1	1	3	3	1	1
CO5	3	1	2	1	1	1	1	1
CO6	3	1	2	1	1	2	2	1
CO7	2	1	1	1	1	1	1	2
CO8	1	1	2	1	1	1	2	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	2
CO2	3	3	1
CO3	2	3	2
CO4	3	1	1
CO5	1	1	3
CO6	1	1	3
CO7	1	3	1
CO8	1	1	3

Suggested Readings:

- Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
- Alberts et al: Molecular Biology of the Cell: Garland (2002).
- Cooper: Cell: A Molecular Approach: ASM Press (2000).
- Karp: Cell and Molecular Biology: Wiley (2002).
- Watson et al. Molecular Biology of the Gene. Pearson (2004).
- Lewin. Genes VIII. Pearson (2004).

- Pierce B. Genetics. Freeman (2004).
- Sambrook *et al. Molecular* Cloning Vols I, II, III. CSHL (2001).
- Primrose. Molecular Biotechnology. Panima (2001).
- Clark & Switzer. Experimental Biochemistry. Freeman (2000)

Course Books published in Hindi must be prescribed by the Universities and Colleges

This course can be opted as an elective by the students of following subjects:
The eligibility for this paper is 10+2 with Biology as one of the subject

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Education) Programme
Course II
(Practical)

Programme/Class: **Diploma/ BSc BEd**	Year: **Second**	Semester: **Third**
Subject: **ZOOLOGY**		
Course Code: **B050302P**	Course Title: **Bioinstrumentation & Molecular Biology Lab**	

Objective: The main aim of this course is to share the knowledge to the students about the experiments and to understand the basic techniques for studying cells and separation of biomolecules and also about the principle of measuring the concentrations of macromolecules in solutions and to use them in Biochemistry. It gives knowledge for better employability in industry.

Credits: **2**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: 40

Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-4**

Unit	Topics	No. of Lectures (60)
I	1. To study the working principle and Simple, Compound and Binocular microscopes. 2. To study the working principle of various lab equipments such as pH Meter, Electronic balance, vortex mixer, use of glass and micropipettes, Laminar flow, Incubator shaker, Waterbath, Centrifuge, Chromatography apparatus, etc to provide employability and skills .	15
II	1. To prepare solutions and buffers. 2. To learn the working of Colorimeter and Spectrohotometer. 3. Demonstration of differential centrifugation to fractionate different components in a mixture for understanding of entrepreneurial skill.	15
III	1. To prepare dilutions of Riboflavin and verify the principle of spectrophotometry. 2. To identify different amino acids in a mixture using paperchromatography. 3. Demonstration of DNA extraction from blood or tissue samples. 4. To estimate amount of DNA using spectrophotometer employability in medical sectors.	15
IV	**Virtual Labs** www.labinapp.com www.uwlax.edu www.labster.com www.onlinelabs.in	15

	www.powershow.in	
	https://vlab.amrita.edu info@premiereducationaltechnologyies.comhttp s://li.wsu.edu	

Course Learning outcomes:

The student at the completion of the course will be able to

CO1:Understand the basic principles of microscopy, working of different types of microscopes or understanding ofentrepreneurial skill.

CO2:Unders and the basic techniques of centrifugation and chromatography for studying cells and separation of biomoleculesfor skill development and employability.

CO3: Underst and the principle of measuring the concentrations of macromolecules in solutions by colorimeter and spectrophoto meter and use them in Biochemistry employability in industry.

CO4: Learn about some of the commonly used advance DNA testing methods for skill development.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	3	3	3	3	2
CO2	2	2	2	2	2	2	2	3
CO3	3	1	2	1	2	2	3	1
CO4	2	1	1	2	2	1	2	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	2
CO2	2	3	1
CO3	2	3	2
CO4	3	2	1

Suggested Readings:

1. Sambrook *et al. Molecular* Cloning Vols I, II, III. CSHL(2001).
2. Primrose. Molecular Biotechnology. Panima(2001).
3. Clark & Switzer. Experimental Biochemistry. Freeman (2000)

Course Books published in Hindi must be prescribed by the Universities and Colleges

This course can be opted as an elective by the students of following subjects:

The eligibility for this paper is 10+2 from Arts/Commerce/Science

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Education)
Programme
Course I
(Theory)

Programme/Class: **Diploma/ B.Sc.B.Ed.**	Year: **Second**	Semester: **Third**
Subject: **Teacher Education [TEC-3]**		
Course Code: **E030301T**	Course Title: **Psychological Foundations of Education**	

Obiective: Education aims to bring desirable change in student's behavior. To realize the objectives ofeducation, teachers need to create such a learning condition in the classroom, in which desirablechange may occur in student's behavior. Therefore, teachers need to understand theories of humandevelopment and various learning behaviors to achieve the objective of education. Educationalpsychology helps the teacher to understand the social-emotional environment of the classroom. Forthe proper development of the students, the teacher needs to understand the individual differences ofthe students regarding their ability, interests, attitudes, and needs at different levels of growth anddevelopment. Knowledge of educational psychology enables the teacher to visualize the aims ofeducation effectively and efficientlyfor skill development and employability.

Credits: **6**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**
Total No. of Lectures-Tutorials-Practical (in hours per week): L- **4-1-1**	Total Contact Hours: **90**

Unit	Topics	No. of Lectures
I	**Educational Psychology** • Meaning, nature, and scope of psychology for development of skills. • Methods of psychology: Observational, experimental, co-relationalstudy, case-study. • Relationship between psychology and education • Meaning, nature, and scope of Educational Psychology • Significance of knowledge of educational psychology forteachers for skill development.	**15L+5T**
II	**Human Development** • Concept of growth and development • Stages of human development • Factors influencing human development	**15L+2T**

	• Dimensions of human development: Social, emotional, moral,linguistic, and cognitive development for skill development and employability.	
III	**Learning and Motivation** • Learning and theories of learning • Factors affecting learning, transfer of learning • Motivation – meaning, the cycle of motivation, techniques for enhancing learner's motivation.	**15L+4T**
IV	**Individual Differences** • Intelligence: Concept of intelligence and its measurement for development of employability and entrepreneurship. • Theories of intelligence, intelligence tests • Personality: Concept of personality and its determinants • Theories of personality • Creativity: Concept, meaning, nature, and teaching strategies tofoster creativity • Difference between intelligence and creativity, identification ofcreative children for skill development and employability.	**15L+4T**
Research Orientation	**Students will be required to** • Administer an Intelligence Test on school students, score,interpret and make conclusions. • Administer a Personality Test on school students, score, interpretand make conclusions • Administer a Creativity Test on school students, score, interpretand make conclusions • Prepare and present a research note of the various stages ofhuman development.	**15P**

Course outcomes:

After the completion of this course, the students will be able to

CO1:Understand the concept, methods and principles of educational psychology for skill development.

CO2:Understandfactors and dimensions of growth and development

CO3:Analyze the theories of learning and motivation for development of skills and knowledge.

CO4:Understand the concept and theories of intelligence, personality, and creativity.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	3	3	3	3	2
CO2	2	2	2	2	2	2	2	3
CO3	3	1	2	1	2	2	3	1
CO4	2	1	1	2	2	1	2	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	2
CO2	2	3	1
CO3	2	3	2
CO4	3	2	1

Suggested Readings:

1. Agarwal, J.C. (1981). Essentials of educational psychology, Delhi: Doaba Books.
1. Atkinson, R.L. (1983). Introduction to psychology. New York: HBT.
2. Chauhan, S.S. (2001). Advanced educational psychology. New Delhi: Vikas PublishingHouse.
3. De Cecco, J.P. ( ). The psychology of learning and instruction. New Delhi: Prentice-Hallof India, Pvt. Ltd.
4. Gage, N.L., & Berliner, D.C. ( ). Educational psychology. Chicago: McNally CollegePublishing Co.,
5. Loran, J.W., & B.L. Walley. ( ). Introduction to early childhood education. New York: D.VanNor Stand Co.
6. Lovel, K. ( ). An Introduction to human development. London: Scott, Foreman and Co.
7. Morse, W.C. & Wingo, G.M.( ). Psychology &teaching. Bombay: P.B. Taraporewala Sons& Co. Pvt. Ltd.
8. Oven, S. ( ). Educational psychology: An introduction. Boston: Little, Brown & Co.
9. Skinner, C.E. (Ed). (1950). Elementary educational psychology. New York: Prentice Hall Inc.1950.
10. Woolfolk, A.( ). Educational psychology. Delhi: Dorling Kindersley (India) Pvt. Ltd.,

This course can be opted as an elective by the students of the following subjects: Open for all

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Suggested equivalent online courses:……..

Further Suggestions:……..

2nd Year, Semester-III

B.Sc.-B.Ed. (Integrated Education) Programme

Course II

(Theory)

Programme/Class: **Diploma/ B.Sc.B.Ed.**	Year: **Second**	Semester: **Third**
Subject: **Teacher Education [PS-2]**		
Course Code: **E030302T**	Course Title: **Pedagogy of Sciences -2**	

Objective:

This course would enable the student teachers to understand science as a scientific discipline throughits philosophical and epistemological perspectives. The course provides an insight into the nature ofsciences, scientific observation, description of scientific modeling, and principles that explain howknowledge of gets constructed. This understanding would help in developing a critical understandingof the science curriculum at the school level. This course also develops a reflection for transactionalprocesses at the various levels of school education. Thus, this course aims to lead the student teachersfrom an understanding of science as a discipline to form a holistic understanding of scienceeducationsituated in learner's context and social realities. This course is aimed at developing theinsights, competencies, and skills among the student teachers who wish to effectively transact thescience curriculum and evolve as a reflective practitioner, capable of translating theoreticalperspectives into pedagogical practices for skill development and employability.

Credits: **3**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**
Total No. of Lectures-Tutorials-Practical (in hours per week): L- **2-0-1**	Total Contact Hours: **45**

Unit	Topics	No. of Lectures
I	**Teacher and Teaching of Sciences** • Teacher: Teacher as a humane, scientific, and reflective practitioner, qualities of a science teacher, professional ethics for a science teacher, reflections on classroom transactions and writing a reflective diary, techniques for enjoying the role of ascience teacher • Teaching-learning processes: Creating an engaging teachinglearning environment, helping learners to actively andcollaboratively engage in learning • Transactional strategies: Inquiry-based approach, inductive and deductive approach, experimentation, demonstration, discussion, investigatory projects, individually paced programmes,	**10T**

	groupwork, peer learning, observation-based survey, problem-solving,guided independent study, seminar presentation, action research for skill development and employability.	
II	**Skills, Resources, and Strategies for Teaching of Sciences** • Teaching skills: Core Skills for teaching sciences (writing instructional objectives, set induction, explaining, blackboard writing, probing questions, response management, illustrating with examples, stimulus variations, reinforcement,demonstration) for skill development and employability. • Teaching resources: Science textbooks, science magazines, science clubs, science exhibition, science kits, science laboratories, museums, field trips, science fairs, virtual sciencelabs • Strategies for teaching: Project method, fieldwork, assignment, demonstration, experiments, problem-solving, concept mapping,experiential learning, collaborative learning, case-based learning,guided discovery, discussion for skill development and employability.	**10T**
III	**Teaching-learning Spaces and Resources** • Learning spaces: Making the classroom a joyful place for learning, making arrangements for student-driven learning, employing technologies in the classroom, using laboratories asalternative places of learning • Learning resources: Instructional aides in science, technologysupported resources, open education resources (OER) in science, science kits, designing and developing content-based and context-based teaching-learning resources for the teachingofscience • Learning Labs: Layout and design of the laboratories in science,storage of apparatus, consumable and non-consumable items,maintenance of laboratory records, making arrangements for theconduct of experiments for skill development .	**10T**
IV	**Assessment in Sciences** • Designing and developing: Assessment for learning, assessmentof learning, formative assessment, summative assessment,assessment of laboratory work, and project work • Assessment: Using creative expression-drawing, posters, drama,poetry, learner profiles, and portfolios; participatory activities,peer support as part of formative assessment for continuousassessment of thinking and process skills Summative	**10T**

	andFormative Assessment (AFL, AOL, AAL) in Science – Nature,Concept, and Scope for skill development . • Critical Analysis: Prevailing assessment patterns for science inschool education, international assessment systems like PISA,TIMMS.	
Practicum	**The students will be required to:** • Planning and discussion of lessons for the school experienceprogramme. • Prepare report cards of learners, based on continuous andcomprehensive assessment. • Develop an e-portfolio based on your learning and experiencesrelated to the teaching of science for skill development.	**5P**

Course outcomes:

After the completion of this course, the students will be able to

CO1:Explain and analyze the role and responsibilities of teachers of sciences.

CO2:Transact contents of sciences effectively by using appropriate teaching-learning resources and approaches for skill development and employability.

CO3: Comprehend about learning space, resources and labs in science for skill development and employability.

CO4:Understand a range of assessment and evaluation strategies in sciences

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	3	3	3	3	2
CO2	2	2	2	2	2	2	2	3
CO3	3	1	2	1	2	2	3	1
CO4	2	1	1	2	2	1	2	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	2
CO2	2	3	1
CO3	2	3	2
CO4	3	2	1

1. **Suggested Readings:**

2. Carin, A., & Sound, R. B. (1996). Discovery teaching in Science. Columbus, Ohio: Charles E.Merrill Books.
3. Kuhn, T. S. (1970). The structure of scientific revolutions. Chicago: University of Chicago.
4. NCERT. (2001). Guidelines and syllabi for secondary stage. New Delhi; NCERT.
5. NCTE. (2009). National curriculum framework for teacher education: Towards preparingprofessional and humane teacher. New Delhi: NCTE.
6. Pollard, A. (2005). Reflective teaching. London: Continuum.
7. Sharma, R.C. (2013). Modern science teaching. New Delhi: DhanpatRai Publishing CompanyLtd.
8. Turner, T., &Dimatea, W. (1998). Learning to teach science in secondary school. USA:Routledge Publication.

This course can be opted as an elective by the students of the following subjects: Open for all

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Suggested equivalent online courses:……..

Further Suggestions:……..

2nd Year, Semester-III
B.Sc.-B.Ed. (Integrated Education) Programme
Course I
(Theory)

Programme/Class: **Certificate/ BSc BEd**	Year: **Second**	Semester: **Third**
Subject: **Co-Curricular Course**		
Course Code: **Z030301**	Course Title: **Human Values and Environmental Studies**	

Objective: The mission of the course on Human Values and Environmental Studies is to create morally articulatesolutions to be truthful and just and to become responsible towards humanity. The course seeks to establish a continuous interest in the readers to improve their thought process with intent to develop anew generation of responsible citizens capable of addressing complex challenges faced by the societydue to disruptions in human interactions effecting human values. This course works towards for skill development and employability.

Credits: **2**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**

Total No. of Lectures-Tutorials-Practical (in hours per week): L- **2/w**

Unit	Topics	No. of Lectures Total=30
I	**Human Values-** Introduction- Values, Characteristics, Types DevelopingValue system in Indian Organization, Values in Business Management,value based Organization, Trans –cultural Human values in Management.Swami Vivekananda's philosophy of Character Building, Gandhi's conceptof Seven Sins, APJ Abdul Kalam view on role of parents and Teachers. **Human Values and Present Practices –** Issues: Corruption and Bribe, Privacy Policy in Web and Social Media, Cyber threats, Online Shopping etc. Remedies UK Bribery Act, Sarbanes Oxley Act, Introduction to sustainable policies and practices in Indian Economy. **Principles of EthicsSecular and Spiritual Values in Management-** Introduction- Secular andSpiritual values, features, Levels of value Implementation. Features ofspiritual Values, **Corporate Social Responsibility-** Nature, Levels,Phasesand Models of CSR, Corporate	2 **2** **3**

	Governance. CSR and Modern BusinessTycoons Ratan Tata, Azim Premji and Bill Gates.	
II	**Holistic Approach in Decision making-** Decision making**,** the decisionmaking process , The Bhagavad Gita: Techniques in Management, Dharmaand Holistic Management **Discussion through Dilemmas** – Dilemmas in Marketing and PharmaOrganisations, moving from Public to Private – monopoly context,Dilemma of privatisation, Dilemma on liberalization, Dilemma on socialmedia and cyber security , Dilemma on Organic food, Dilemma onstandardization ,Dilemma on Quality standards. **Case Studies**	**3** **3** **2**
III	• Ecosystem: Concept, structure & functions of ecosystem: producer, • consumer, decomposer, foodweb, food chain, energy flow, Ecologicalpyramids • Conservation of Biodiversity- In-situ & Ex- situ conservation ofbiodiversity • Role of individual in Pollution control • Human Population & Environment • Sustainable Development • India and UN Sustainable Development Goals • Concept of circular economy and entrepreneurship	**7**
IV	• Environmental Laws? • International Advancements in Environmental Conservation • Role of National Green Tribunal • Air Quality Index • Importance of Indian Traditional knowledge on environment • Bio assessment of Environmental Quality • Environmental Management System • Environmental Impact Assessment and Environmental Audit	**8**

Course outcomes:

CO1:Building fundamental knowledge of the interplay of markets, ethics, and law.

CO2: Look at various challenges faced by individual to counter unethical issues, business ethics, core concepts of anti-corruption.

CO3:Morally articulate solution evolver to management issues in general,

CO4: Issues of sustainable development for a better environment for skill development.

CO5: To know how environmental degradation has taken place.

CO6: Be aware of negotiations and international efforts to save environment.

CO7: How to develop sustainably for skill development?

CO8: Efforts taken up by UN and India in Sustainable Development for skill development.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	3	3	3	3	2
CO2	2	2	2	2	2	2	2	3
CO3	3	1	2	1	2	2	3	1
CO4	2	1	1	2	2	1	2	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	2
CO2	2	3	1
CO3	2	3	2
CO4	3	2	1

Suggested Readings:

A foundation course in Human Values and Professional Ethics by RR. Gaur, R. Sangal *et.al*

1. JUSTICE: What's the Right Thing to Do? Michael J. Sandel.
2. Human Values by A. N. Tripathi New Age International
3. Environmental Management by N.K. Uberoi
4. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
5. https://www.india.gov.in/my-government/schemes
6. https://www.legislation.gov.uk/ukpga/2010/23/contents
7. Daniel Kahneman, Thinking, Fast and Slow; Allen Lane Nov 2011 ISBN: 9780141918921

Suggested equivalent online courses: ……..

Further Suggestions:

It can be considered to change the course title to Human Values and Sustainable Development.

Structure, Syllabus & Evaluation Scheme
B.Ed. Integrated (B.Sc.-B.Ed.) Programme
Course Structure
Semester-IV

Year: Second **Semester:** Fourth

Subject Description	Subject Code	Subject Title (Theory & Practical)	Credits	Continuous Internal Evaluation (CIE)	University Exam. (UE)		Max. Marks
					Theory	Practical	
Choose any Two Subjects (Core Course) on the Basis of Semester-III							
Physics	B010401T	PerspectivesofModernPhysics&Modern Optics	04	25	75	--	100
	B010402P	DemonstrativeAspectsofOptics&Lasers	02	25	--	75	100
Chemistry	B020401T	Quantum Mechanics and Analytical Techniques	04	25	75	--	100
	B020402P	Instrumental Analysis	02	25	--	75	100
Mathematics	B030401T	DifferentialEquation&Mechanics	06	25	75	--	100
Botany	B040401T	Economic Botany, Ethnomedicine & Phytochemistry	04	25	75	--	100
	B040402P	Commercial Botany & Phytochemical Analysis	02	25	--	75	100
Zoology	B050401T	Gene Technology and Human Welfare	04	25	75	--	100
	B050402P	Genetic Engineering Lab, Genetic Counselling& Telemedicine	02	25	--	75	100
Teacher Education Course							
Teacher Education Course **[TEC-4]**	E030401T	Structure and Management of School Education in India [TEC-4]	**6**	**25**	**75**	**--**	**100**
Elective Course							
ElectiveCourse **[EC-2]**	TECEC-2	Environmental Education	**6**	**25**	**75**	**--**	**100**
Pedagogy (Vocational Course)							
Teacher Education Course **[EWP-2]**	E030402P	Engaging with Pedagogies-2 [EWP-1]	**3**	**25**	**--**	**75**	**100**

Co-Curricular Course							
Co-Curricular Course **[CCC-4]**	Z040401	Physical Education and Yoga	**2**	**25**	**75**	**--**	**100**
Industrial Training							
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SEMESTER-IV

Courses	Number	Code
Core Courses (Subjects)	**2**	CC1-4, CC2-4
Teacher Education Courses	**1**	TEC-4
Pedagogy Courses	**1**	EWP-2
Co-Curricular Course	**1**	CCC-4
Elective Course	**1** (either in III or IV Semester)	EC-2

Note: Course name, content, credits, and assessment scheme of CC1-4, CC2-4, CCC-4, and EC-2 will be as per the new proposed syllabus of UGprograms of Science/Arts Streams.

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course I
(Theory)

Programme/ Class: **DIPLOMA/BSc BEd**	Year: **SECOND**	Semester: **FOURTH**
Subject: **Physics**		
Course Code: **B010401T**	Course Title: **Perspectives of Modern Physics & Modern Optics**	

Course Outcomes:

Aftercompletingthiscourse, thestudents willbe able to:

CO1: Recognize the difference between the structure of space & time in Newtonian & Relativistic mechanics.

CO2: Understand the physical significance of consequences of Lorentz transformation equations.

CO3: Comprehend the wave-particle duality.

CO4: Develop an understanding of the foundational aspects of Quantum Mechanics.

CO5: Study the working and applications of Michelson and Fabry-Perot interferometers.

CO6: Recognize the difference between Fresnel's and Fraunhofer's class of diffraction.

CO7: Comprehend the use of polarimeters.

CO8: Study the characteristics and uses of lasers.

Credits: **04**	Paper:**CoreCompulsory**
Max.Marks: **25+75**	Min.Pass Marks: **40**

TotalNo.of Lectures-Tutorials-Practical(inhoursperweek): **4-0-0**.

Unit	Topic **Perspectives of Modern Physics**	No. of Lectures
I	**Relativity-Experimental Background** Structure of space & time in Newtonian mechanics and inertial & non-inertial frames. Galileantransformations. Newtonian relativity. Galilean transformation and Electromagnetism. Attempts tolocate the Absolute Frame: Michelson-Morley experiment and significance of the null result.Einstein's postulates of special theory of relativity.	7
II	**Relativity-Relativistic Kinematics** Structure of space & time in Relativistic mechanics and derivation of Lorentz transformationequations (4-vector formulation included). Consequences of Lorentz Transformation Equations(derivations & examples included): Transformation of Simultaneity (Relativity of simultaneity);Transformation of Length (Length contraction); Transformation of Time (Time dilation);Transformation of Velocity (Relativistic velocity addition); Transformation of Acceleration;Transformation of Mass (Variation of mass with velocity). Relation between Energy &	9

	Mass(Einstein's mass & energy relation) and Energy &Momentum.	
III	**Inadequacies of Classical Mechanics** Particle Properties of Waves: Spectrum of Black Body radiation, Photoelectric effect, Comptoneffect and their explanations based on Max Planck's Quantum hypothesis.Wave Properties of Particles: Louis de Broglie's hypothesis of matter waves and their experimentalverification by Davisson-Germer's experiment and Thomson's experiment.	7
IV	**Introduction to Quantum Mechanics** Matter Waves: Mathematical representation, Wavelength, Concept of Wave group, Group (particle)velocity, Phase (wave) velocity and relation between Group & Phase velocities.Wave Function: Functional form, Normalisation of wave function, Orthogonal & Orthonormalwave functions and Probabilistic interpretation of wave function based on Born Rule.	11
	Part b **Physical Optics & Lasers**	
V	**Interference** Conditions for interference and spatial & temporal coherence. Division of Wavefront - Fresnel'sBiprism and Lloyd's Mirror. Division of Amplitude - Parallel thin film, wedge shaped film andNewton's Ring experiment. Interferometer - Michelson and Fabry-Perot.	8
VI	**Diffraction** Distinction between interference and diffraction. Fresnel's and Fraunhofer's class of diffraction.Fresnel's Half Period Zones and Zone plate. Fraunhofer diffraction at a single slit, n slits andDiffracting Grating. Resolving Power of Optical Instruments - Rayleigh's criterion and resolvingpower of telescope, microscope & grating.	8
VII	**Polarisation** Polarisation by dichronic crystals, birefringence, Nicol prism, retardation plates and Babinet'scompensator. Analysis of polarized light. Optical Rotation - Fresnel's explanation of opticalrotation and Half Shade & Biquartz polarimeters.	7
VIII	**Lasers** Characteristics and uses of Lasers. Quantitative analysis of Spatial and Temporal coherence.Conditions for Laser action and Einstein's coefficients. Three and four level laser systems(qualitative discussion).	7

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3			2				
CO 2				1		2		
CO 3			2	1				
CO 4				2	2			
CO 5			2			2		
CO 6			3			1		
CO 7			2			1		
CO 8			2			1		

CO- Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	Skill Development	Employability	EntrepreneurshipDevelopment
CO1	2		
CO2	2		
CO3	1		
CO4	1		

SuggestedReadings:

PART A

1. A. Beiser, Shobhit Mahajan, "Concepts of Modern Physics: Special Indian Edition", McGraw Hill, 2009, 6e
2. John R. Taylor, Chris D. Zafiratos, Michael A.Dubson, "Modern Physics for Scientists and Engineers",
2. Prentice-Hall of India Private Limited, 2003, 2e
3. R.A. Serway, C.J. Moses, and C.A. Moyer, "Modern Physics", Cengage Learning India Pvt. Ltd, 2004, 3e
4. R. Resnick, "Introduction to Special Relativity", Wiley India Private Limited, 2007
5. R. Murugeshan, KiruthigaSivaprasath, "Modern Physics", S. Chand Publishing, 2019, 18e

PART B

1. Francis A. Jenkins, Harvey E. White, "Fundamentals of Optics", McGraw Hill, 2017, 4e
2. Samuel Tolansky, "An Introduction to Interferometry", John Wiley & Sons Inc., 1973, 2e
3. A. Ghatak, "Optics", McGraw Hill, 2017, 6e

Course Books published in Hindi may be prescribed by the Universities.

Suggestive Digital Platforms / Web Links

1. MIT Open Learning - Massachusetts Institute of Technology, https://openlearning.mit.edu/
2. National Programme on Technology Enhanced Learning (NPTEL), https://www.youtube.com/user/nptelhrd
3. Uttar Pradesh Higher Education Digital Library, http://heecontent.upsdc.gov.in/SearchContent.aspx
4. Swayam Prabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/program/current_he/8

This course can be opted as an Elective by the students of following subjects

Open to all

Suggested Equivalent Online Courses

1. Coursera, https://www.coursera.org/browse/physical-science-and-engineering/physics-and-astronomy
2. edX, https://www.edx.org/course/subject/physics
3. MIT Open Course Ware - Massachusetts Institute of Technology, https://ocw.mit.edu/courses/physics/
4. Swayam - Government of India, https://swayam.gov.in/explorer?category=Physics
5. National Programme on Technology Enhanced Learning (NPTEL), https://nptel.ac.in/course.html

Further Suggestions

In End-Semester University Examinations, equal weightage should be given to Part A (units I to IV) and Part B (units V to VIII) while framing the questions.

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course II
(Practical)

Programme/Class: **Diploma/ BS BEd**	Year: **Second**	Semester: **Fourth**
Subject: **Physics**		
Course Code: **B010402P**	Course Title: **Demonstrative Aspects of Optics & Lasers**	

Course Learning outcomes:

Experimental physics has the most striking impact on the industry wherever the instruments are used to determinethe optical properties. Measurement precision and perfection is achieved through Lab Experiments. Online VirtualLab Experiments give an insight in simulation techniques and provide a basis for modeling.

Credits: **2**	Core Compulsory
Max. Marks: **100**	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): 0-**0-4**

Unit	Topics	No. of Lectures
	Lab Experiment List	
I	1. Fresnel Biprism: Wavelength of sodium light 2. Fresnel Biprism: Thickness of mica sheet) 3. Newton's Rings: Wavelength of sodium light 4. Newton's Rings: Refractive index of liquid 5. Plane Diffraction Grating: Resolving power 6. Plane Diffraction Grating: Spectrum of mercury light 7. Spectrometer: Refractive index of the material of a prism using sodium light 8. Spectrometer: Dispersive power of the material of a prism using mercury light 9. Polarimeter: Specific rotation of sugar solution 10. Wavelength of Laser light using diffraction by single slit	60
	Online Virtual Lab Experiment List / Link	
	Virtual Labs at Amrita Vishwa Vidyapeetham https://vlab.amrita.edu/?sub=1&brch=189 1. Michelson's Interferometer 2. Michelson's Interferometer: Wavelength of laser beam 3. Newton's Rings: Wavelength of light 2. Newton's Rings: Refractive index of liquid 3. Brewster's angle determination 4. Laser beam divergence and spot size	

Course Outcomes:

Students completing this course will be able to:

CO1: Experimentalphysicshasthemoststrikingimpactontheindustrywherevertheinstruments areusedtostudyand determinetheopticalproperties.

CO2: Develop skills forMeasurementprecisionandperfectionisachievedthroughLabExperiments.

CO3: OnlineVirtual LabExperimentsgiveaninsightinsimulationtechniquesandprovidea basisformodeling.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO 1							2	
CO 2					3	3	2	1
CO 3					2		1	

CO- Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	Skill Development	Employability	EntrepreneurshipDevelopment
CO1	1		
CO2	2		
CO3	1		
CO4	2		

Suggested Readings:

1. B.L. Worsnop, H.T. Flint, "Advanced Practical Physics for Students", Methuen & Co., Ltd., London, 1962, 9e
2. S. Panigrahi, B. Mallick, "Engineering Practical Physics", Cengage Learning India Pvt. Ltd., 2015, 1e
2. S.L. Gupta, V. Kumar, "Practical Physics", Pragati Prakashan, Meerut, 2014, 2e

Course Books published in Hindi may be prescribed by the Universities.

Suggestive Digital Platforms / Web Links
1. Virtual Labs at Amrita Vishwa Vidyapeetham, https://vlab.amrita.edu/?sub=1&brch=189
2. Digital platforms of other virtual labs

This course can be opted as an Elective by the students of following subjects
Botany / Chemistry / Computer Science / Mathematics / Statistics / Zoology

Course Prerequisites
Opted / Passed Semester IV, Theory Paper-1 (B010401T)

Suggested Equivalent Online Courses

Further Suggestions

- The institution may add / modify / change the experiments of the same standard in the subject.
- The institution may suggest a minimum number of experiments (say 6) to be performed by each student persemester from the Lab Experiment List.
- The institution may suggest a minimum number of experiments (say 3) to be performed by each student persemester from the Online Virtual Lab Experiment List / Link.

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course I
(Theory)

Programme/Class: **Diploma/ BSc BEd**	Year: **Second**	Semester: **Fourth**
Subject: **Chemistry**		
Course Code: **BO20401T**	Course Title: **Quantum Mechanics and Analytical Techniques**	

Course Learning outcomes:

Upon successful completion of this course students should be able to describe atomic structure, elementary quantum mechanics ,wave function and its significance ;Schrodinger wave equation and its applications;Molecular orbital theory, basic ideas – Criteria for forming molecular orbital from atomic orbitals , MolecularSpectroscopy, Rotational Spectrum ,vibrational Electronic Spectrum: photo chemistry and kinetics of photo chemicalreaction

Analytical chemistry plays an enormous role in our society, such as in drug manufacturing, process control in industry,environmental monitoring, medical diagnostics, food production, and forensic surveys. It is also of great importance indifferent research areas. Analytical chemistry is a science that is directed towards creating new knowledge so thatchemical analysis can be improved to respond to increasing or new demands

Credits: **4**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): **4-0-0**	

Unit	Topics	No. of Lectures
I	**Atomic Structure:** Idea of de-Broglie matter waves, Heisenberg uncertainty principle, atomicorbitals, Schrödinger wave equation, significance of Ψ and Ψ 2 , quantum numbers, radial andangular wave functions and probability distribution curves, shapes of s, p, d, orbitals. Aufbauand Pauli exclusion principles, Hund's multiplicity rule.	5
II	**Elementary Quantum Mechanics** : Black-body radiation, Planck's radiation law, photoelectriceffect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects,Compton effect. de-Broglie hypothesis. Heisenberg uncertainty principle. Hamiltonian Operator. Schrödinger wave equation (time dependent and time independent) and its importance, physicalinterpretation of the wave function, postulates of quantum mechanics, particle in a onedimensional box. Schrödinger wave equation for H-atom, separation into three equations (withoutderivation), quantum numbers and their importance, hydrogen like wave functions, radial wavefunctions, angular wave functions. Molecular orbital theory, basic ideas – Criteria for formingMO from AO, construction of MO by LCAO – H2 + ion, calculation of energy levels from wavefunctions, physical picture of bonding and anti-bonding wave functions, concept of σ, σ*, π, π*orbitals and their characteristics.	10
III	**Molecular Spectroscopy**: Introduction: Electromagnetic radiation, regions of the spectrum, basicfeatures of different spectrometers, statement of the Born-Oppenheimer approximation, degreesof freedom **Rotational Spectrum**:Diatomic molecules. Energy levels of a rigid rotor	10

	(semi-classicalprinciples), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect. **Vibrational Spectrum:** Infrared spectrum : Energy levels of simple harmonic oscillator,selection rules, pure vibrational spectrum, intensity, determination of force constant andqualitative relation of force constant and bond energies, effect of anharmonic motion and isotopeon the spectrum, idea of vibrational frequencies of different functional groups. **Raman spectrum:** Concept of polarizability, pure rotational and pure vibrational, Ramanspectra of diatomic molecules, selection rules. Electronic Spectrum: Concept of potential energycurves for bonding and antibonding molecular orbitals, qualitative description of selection rulesand Franck-Condon principle.	
IV	**UV-Visible Spectroscopy :** Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy andselection rules. Types of electronic transitions, λmax, chromophores and auxochromes,Bathochromic and Hypsochromic shifts, Intensity of absorption; application of Woodward Rulesfor calculation of λmax for the conjugated dienes: alicyclic, homoannular and heteroannular;extended conjugated systems distinction between cis and trans isomers.	5
V	**Infrared Spectroscopy:** **IR Spectroscopy**: Fundamental and non-fundamental molecular vibrations; Hooke's lawselection rule, IR absorption positions of various functional groups; Effect of H-bonding,conjugation, resonance and ring size on IR absorptions; Fingerprint region and its significance; application in functional group analysis and and interpretation of I.R. spectra of simple organiccompounds.	5
VI	**1H-NMR Spectroscopy (PMR)** NMR Spectroscopy: introduction; nuclear spin; NMR active molecules; basic principles of ProtonMagnetic Resonance; choice of solvent and internal standard; equivalent and non-equivalentprotons; chemical shift and factors influencing it; ring current effect; significance of the terms:up-/downfield, shielded and deshielded protons; spin coupling and coupling constant (1st orderspectra); relative intensities of first-order multiplets: Pascal's triangle; chemical and magneticequivalence in NMR ; anisotropic effects in alkene, alkyne, aldehydes and aromatics; NMR peakarea, integration; relative peak positions with coupling patterns of common organic compounds;interpretation of NMR spectra of simple compounds. Applications of IR, UV and NMRspectroscopy for identification of simple organic molecules.	10
VII	**Introduction to Mass Spectrometry:** Principle of mass spectrometry, the mass spectrum, massspectrometry diagram, molecular ion, metastable ion, fragmentation process, McLaffertyrearrangement.	3
VIII	**Separation Techniques: Solvent** extraction: Classification, principle and efficiency of thetechnique. Mechanism of extraction: extraction by solvation and chelation. Technique ofextraction: batch, continuous and counter current extractions. Qualitative and quantitative aspectsof solvent extraction: extraction of metal ions from aqueous solution, extraction of	7

	organic speciesfrom the aqueous and non-aqueous media. **Chromatography:** Classification, principle and efficiency of the technique. Mechanism ofseparation: adsorption, partition & ion exchange. Development of chromatograms: frontal, elutionand displacement methods.	

Course outcomes:

Upon successful completion of this course students should be able to:

CO1: Describe atomic structure, wave function and its significance;Schrodinger wave equation and its applications.

CO2: Learn elementary quantum mechanics, molecular orbital theory, basic ideas – Criteria for forming molecular orbital from atomic orbitals.

CO3: Development of basic skills toAnalyze molecular Spectra such as rotational,vibrationaland Raman Spectra

CO4: Learn concepts of electronic spectrum, Woodward=Fieser rules and fundamental laws of spectroscopy.

CO5: Determine various functional groups of organic molecules using IR spectra.

CO6: Determine the structure of organic molecules using NMR spectroscopic techniques.

CO7: Skill development to understand the importance of mass spectra in determination of structure of organic compounds.

CO8: Develop basic skills required for purification, solvent extraction, TLC and column chromatography

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): CO- Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	1	2	1	2	2	2
CO2	3	1	1	2	1	2	2	2
CO3	3	3	3	2	3	2	2	2
CO4	3	3	3	2	1	2	2	2
CO5	2	3	3	2	2	2	3	3
CO6	2	3	3	2	2	2	1	1
CO7	2	3	3	1	3	1	1	3
CO8	2	3	3	1	2	2	3	1

CO-Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	Skill Development	Employability	Entrepreneurship
CO1	3	1	1
CO2	3	1	1
CO3	3	2	1
CO4	3	2	1

Suggested Readings:

1. Alberty,R A, Physical Chemistry,4 theditionWiley Eastern Ltd ,2001.
2. Atkins,PW,the elements of physical chemistry,Oxford ,1991
3. Barrow,G .M,International student Edition .McGraw Hill, McGraw-Hill,1973.
2. Cotton,F.A, Wilkinson,G and Gaus,P. L ,Basic Inorganic Chemistry,3rd Edition ,Wiley 1995
3. Lee,J.D, Concise Inorganic Chemistry 4th Edition ELBS,1977
4. Clayden, J., Greeves, N., Warren, S., *Organic Chemistry*, Second edition, Oxford University Press 2012.
5. Silverstein, R. M., Bassler, G. C., Morrill, T. C. *Spectrometric Identification of Organic Compounds*, John
6. Wiley and Sons, INC, Fifth edition.
7. Pavia, D. L. *et al. Introduction to Spectroscopy,* 5th Ed. Cengage Learning India Ed.
8. Willard, H.H. *et al.*: *Instrumental Methods of Analysis*, 7th Ed. Wardsworth Publishing Company, Belmont,
9. California, USA, 1988.
10. Christian, G.D. *Analytical Chemistry*, 6th Ed. John Wiley & Sons, New York, 2004.
11. Harris, D.C.: *Exploring Chemical Analysis*, 9th Ed. New York, W.H. Freeman, 2016.
12. Khopkar, S.M. *Basic Concepts of Analytical Chemistry*. New Age International Publisher, 2009.

Suggestive digital platforms web links

1. https://www.coursera.org/courses?query=chemistry&languages=en
2. https://www.mooc-list.com/tags/physical-chemistry
3. https://www.coursera.org/learn/physical-chemistry
4. https://ocw.mit.edu/courses/chemistry/5-61-physical-chemistry-fall-2017/
5. http://heecontent.upsdc.gov.in/Home.aspx
6. https://nptel.ac.in/courses/104/108/104108078/
7. https://nptel.ac.in/courses/104/108/104108124/
8. https://nptel.ac.in/courses/104/106/104106122/

This course can be opted as an elective by the students of following subjects: Chemistry in 12th Class

Suggested Continuous Evaluation Methods: Students can be evaluated on the basis of score obtained in a
mid-term exam, together with the performance of other activities which can include short exams, in-class or
on-line tests, home assignments, group discussions or oral presentations, among others.

Or

Course prerequisites: To study this course, a student must have had the chemistry in class 12th

Suggested equivalent online courses:

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Further Suggestions:

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2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course I
(Theory)

Programme/Class: **Diploma/ BSc BEd**	Year: **Second**	Semester: **Fourth**
Subject: **Chemistry**		
Course Code: **B020402P**	Course Title: **Instrumental Analysis**	

Course Learning outcomes:

Upon completion of this course, chemistry majors are able to employ critical thinking andscientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at alevel suitable to succeed at an entry-level position in chemical industry or a chemistry graduate program.

CO1: Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.

CO2: Students will be able to function as a member of an interdisciplinary problem solving team.

CO3: Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems

CO4: Students will gain an understanding of how to determine the structure of organic molecules using IR and NMR spectroscopic techniques

CO5:To develop basic skills required for purification, solvent extraction, TLC and column chromatography

Credits: **2**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: 40

Total No. of Lectures-Tutorials-Practical (in hours per week): 0-**0-4**

Unit	Topics	No. of Lectures
I	**Molecular Weight Determination** 1. Determination of molecular weight of a non-volatile solute by Rast method/ Beckmann freezing point method. 2. Determination of the apparent degree of dissociation of an electrolyte (e.g., NaCl) in aqueous solution at different concentrations by ebullioscopy	**10**
II	**Spectrophotometry** 1. To verify Beer – Lambert Law for KMnO4/K2Cr2O7 and determining the concentration 2. of the given solution of the substance from absorption measurement 3. Determination of pKa values of indicator using spectrophotometry. 4. Determination of chemical oxygen demand (COD). 5. Determination of Biological oxygen demand (BOD).	**20**
III	**Spectroscopy** 1. Assignment of labelled peaks in the IR spectrum of the same compound explaining therelative frequencies of the absorptions (C-H, O-H, N-H, C-O, C-N, C-X, C=C, C=O,N=O, C≡C, C≡N stretching	**10**

	frequencies; characteristic bending vibrations are included.Spectra to be provided). 2. Assignment of labelled peaks in the 1H NMR spectra of the known organic compoundsexplaining the relative δ-values and splitting pattern. **3.** Identification of simple organic compounds by IR spectroscopy and NMRspectroscopy (Spectra to be provided).	
IV	**Chromatographic Separations** 1. Paper chromatographic separation of following metal ions: i. Ni (II) and Co (II) ii.Cu(II) and Cd(II) 2. Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layerChromatography (TLC) 3. Separation and identification of the amino acids present in the given mixture by paperchromatography. Reporting the Rf values **4.** TLC separation of a mixture of dyes (fluorescein and methylene blue)	**20**

Suggested Readings:

1. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis 6th Ed.,* Pearson, 2009.
2. Willard, H.H. *et al.*: *Instrumental Methods of Analysis*, 7th Ed. Wardsworth Publishing Company, Belmont,California, USA, 1988.
3. Christian, G.D. *Analytical Chemistry*, 6th Ed. John Wiley & Sons, New York, 2004.
4. Harris, D.C.*Exploring Chemical Analysis*, 9th Ed. New York, W.H. Freeman, 2016.
5. Khopkar, S.M. *Basic Concepts of Analytical Chemistry*. New Age International Publisher, 2009.
6. Skoog, D.A. Holler F.J. and Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning IndiaEdition.
7. Mikes, O. &Chalmes, R.A. *Laboratory Handbook of Chromatographic &AlliedMethods*, Elles HarwoodLtd. London.
8. Ditts, R.V. *Analytical Chemistry: Methods of separation.* Van Nostrand, New York, 1974.

Note: For the promotion of Hindi language, course books published in Hindi may be prescribed by the University

Suggestive digital platforms web links

1. https://www.labster.com/chemistry-virtual-labs/
2. https://www.vlab.co.in/broad-area-chemical-sciences
3. http://chemcollective.org/vlabs

This course can be opted as an elective by the students of following subjects: Chemistry in 12th Class

Course prerequisites: To study this course, a student must have had the chemistry in class

Suggested equivalent online courses:

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Further Suggestions:

……..

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course I
(Theory)

Programme/Class: **Diploma/ BSc BEd**	Year: **Second**	Semester: **Fourth**
Subject: **Mathematics**		
Course Code: **B030401T**	Course Title: **DifferentialEquations&Mechanics**	

Objective: - The main aims of this course to provide the solution of second-order linear equations, power series solutions and higher-order linear equations, systems of equations, non-linear equations, Sturm Liouville theory, and applications. An introduction to numerical solutions and applications of differential equations in physics, engineering, biology, and economics are presented. This course covers more material at greater depth than the standard undergraduate-level ODE course also this course are helps the students to develop skills, employability and knowledge of standard concepts in mechanics to become aware of their applications. Both the components of mechanics, namely, statics and dynamics are dealt with in this course. Study of various forces and components.

Credits: **6**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): **6-0-0**	

Unit	Topics	No. of Lectures
I	Second order linear differential equations with variable coefficients:Use of aknown solution to find another, normal form, method of undetermined coefficient, variation of parameters, Series solutions of differential equations, Power series method.	**12**
II	Bessel, Legendreand Hypergeometric functions and their properties, recurrence and generatin grelations.	**11**
III	Origin of first order partial differential equations. Partial differential equations of the first order and degree one, Lagrange's solution, Partial differential equation of first order and degree greater than one. Charpit's method of solution, Surfaces Orthogonal to the given systemof surfaces.	**11**
IV	Origin of second orderPDE, Solution of partial differential equations of these condand higher order with constant coefficients, Classification of line arpartial differential equations of second order, Solution of second order partial differential equations with variable coefficients, Monge's method of solution.	**11**
	Part B:**Mechanics**	
V	Frame of reference, work energy principle, Forces in three dimensions, Poinsot's centralaxis, Wrenches, Nulllines and planes.	**12**
VI	Virtualwork, Stableand Unstable equilibrium, Catenary, Catenary of uniform strength.	**11**
VII	Velocities and accelerationsal on gradial andtransverse directions, and alongtangential and normal directions, Simple Harmonicmotion, Motion under other law offorces. Elasticstrings, Motioninresistingmedium,	**11**

	Constrained motion, Motionon smooth and rough plane curves.	
VIII	Motion of particles of varyingmass, Rocketmotion, Centralorbit, Kepler's laws of motion, Motion of particlein three dimensions, Rotating frame of reference, Rotating Earth, Accelerationin terms of different coordinates systems.	**11**

Course outcomes:

CO1:The objective of this course is to familiarize the students with various methods of solving differential equations, partial differential equations of first order and second order and to have qualitative applications.

CO2: A student doing this course is able to solve differential equations and is able to model problems in nature using ordinary differential equations. After completing this course, a student will be able to take more courses on wave equation, heat equation, diffusion equation, gas dynamics, nonlinear evolution equation etc for skill development.

CO3: The object of the course is to give students knowledge of basic mechanics such as simple harmonic motion, motion under other laws and forces.

CO4: The student, after completing the course can go for higher problems in mechanic such as Hydrodynamics this will be helpful in getting employment in industry.

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	3	3	3	2
CO2	3	3	3	1	3	2	2	3
CO3	3	1	3	3	2	2	1	3
CO4	3	2	3	2	3	3	3	2

CO- Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	Skill Development	Employability	Entrepreneurship
CO1	3	1	1
CO2	3	1	1
CO3	3	2	1
CO4	3	2	1

Suggested Readings:

1. G.F.Simmons, Differential Equations with Application and Historical Notes,Tata–McGraw Hill

2. B.Rai,D.P.Choudhary & H.J.Freedman, ACourse of Ordinary Differential Equations, Narosa

3. IanN.Snedden, Elements of Partial Differential Equations,Dover Publication

4. L.E.Elsgolts, Differential Equationand Calculus of variations, University Press of the Pacific.

5. Suggested digitalplate form:NPTEL/SWAYAM/MOOCs

6. CourseBooks (text/reference) published in Hindi may be prescribed by the Universities at locallevels.

SuggestedReadings(Part-BMechanics):

1. R.C.Hibbeler, Engineering Mechanics-Statics,Prentics HallPublishers

2. R.C.Hibbeler, Engineering Mechanics-Dynamics,Prentics Hall Publishers

3. A.Nelson, Engineering Mechanics Statics andDynamics,Tata Mc Graw Hill

4. J.L.Synge & B.A. Griffith, Principles of Mechanics, Tata Mc Graw Hill

5. Suggested digital platform: NPTEL/SWAYAM/MOOCs

6. Course Books (text/ reference) publishedin Hindi may be prescribed by the Universities at local levels.

This course can be optedasan elective by the students of following subjects: Engg. And Tech.(UG), Economics (UG/PG),B.Sc.(C.S.)

Course prerequisites: To study this course, a student must have Certificate Course in Applied Mathematics

Suggested equivalent online courses:

Further Suggestions:

2nd Year, Semester-IV

B.Sc.-B.Ed. (Integrated Education) Programme

Course I

(Theory)

Programme/Class: **Diploma/ BSc BEd**	Year: **Second**	Semester: **Fourth**
Subject: **Botany**		
Course Code: **B040401T**	Course Title: **Economic Botany, Ethnomedicine and Phytochemistry**	
Objective: The objective of proposed course is expose to the students of centres of origin of crop plants for skill development, entrepreneurship and employability, concept of primary and secondary homes of domestication, green revolution in India with special reference to Norman E. Borlaug, M. S. Swaminathan, and economic importance of various plants and their products.		
Credits: **4**	Core Compulsory	
Max. Marks: **25+75**	Min. Passing Marks: 40	
Total No. of Lectures-Tutorials-Practical (in hours per week): L- **4/w**		

Unit	Topics	No. of Lectures
	Part I	
I	**Origin and domestication of cultivated plants** Centers of diversity of plants, origin of crop plants. Domestication and introduction of crop plants. Concepts of sustainable development; cultivation, production and uses of Cereals, legumes, Spices & beverages.	**7**
II	**Botany of oils, Fibers, timber yielding plants & dyes** Study of the plants with Botanical names, Family, part used, and economic uses yielding Edible & essential oils; Sugar , Starch; Fibers; Paper, Fumitories & Masticatories, Rubber ,Dyes, Timber,biofuel crops	**7**
III	**Commercial production of Flowers, Vegetables, and fruits (To be Chosen area wise)** Commercial greenhouse cultivation of rose, Gerbera, Gladiolus, Anthurium/lilium/lily, tomato, bell pepper, cucumber, strawberry & Exotic leafy vegetables using Hydroponics.	**7**
IV	**IPR & Traditional Knowledge** IPR and WTO (TRIPS, WIPO), Patent Act 1970 and its amendments,TIFAC,NRDC,Rights, Procedure of obtaining patents, Working of patents, Infringement, Copyrights, Trademarks, Geographical Indications, Traditional Knowledge Digital Library, Protection of TraditionalKnowledge & Protection of Plant Varieties and Biotech inventions.	**8**
V	**Ethnobotany** Methodologies of ethnobotanical research: Field work, Literature, Herbaria and Musea and other aspects of ethnobotany. Importance of ethnobotany in Indian systems of medicine (Siddha, Ayurveda and Unani), Role of AYUSH, NMPB, CIMAP and CARI.Tribal knowledge towards disease diagnosis, treatment, medicinal plants, plant conservation and cultivation.	**8**
VI	**Medicinal aspects** Study of common plants used by tribes(*Aegle marmelos, Ficus*	**8**

	religiosa, Cynadondactylon, Eclipta alba, Oxalis, Ocimum sanctum and *Trichopuszeylanicus)* Ethnobotanical aspect of conservation and management of plant resources, Preservation of primeval forests in the form of sacred groves of individual species and Botanical uses depicted in our epics.Plants in primary health care*:* common medicinal plants*: Tinospora, Acorus, Ocimum*, Turmeric and Aloe.Indian Pharmacopeia,Quality Evaluation of crude drugs & adulteration.	
VII	**Pharmacognosy** Preparation of drugs for commercial market - Organoleptic evaluation of drugs - Microscopic evaluation of drugs - Physical evaluation of drugs - Active and inert constituents of drugs - Classification of drug plants - individual drugs - drug adulteration. Sources of crude drugs – roots, rhizome, bulb, corm, leaves, stems, flowers, fruits and seeds ; organoleptic study of *Adhatodavasica, Andrographis paniculata, Azadirachta indica, Coriandrum sativum, Datura metal, Eclipta alba, Emblica officinalis, Ocimum sanctum,Phyllanthus amarus, Ricinus communis, Vinca rosea and Zingiber officinale.*	**8**
VIII	**Herbal Preparations &Phytochemistry :** Collection of wild herbs - Capsules - compresses - Elixirs - Glycerites - Hydrotherapy or Herbal bath - Herbal oils - Liquid extracts or Tincture - Poultices - Salves - Slippery elm slurry and gruel - Suppositories - Teas. Plant natural products, general detection, extraction and characterization procedures. Glycosides and Flavonoids and therapeutic applications. Anthocyanins and Coumarins and therapeutic applications, Lignans, Terpenes, Volatile oilsand Saponins, Carotenoids and Alkaloids Carotenoids and pharmacological activities.	**7**

Course outcomes: After the completion of the course the students will be able to:

CO1: Understand about the uses of plants –will know one plant-one employment

CO2: Know origin of Agriculture, world centers of domesticated plants.

CO3: Understand the green revolution in India and what is the role of Norman E. Borlaug, M. S. Swaminathan?

CO4: Have the knowledge of plants as food, sugar yielding plants for skill development and employability

CO5: Have the knowledge of medicinal values of the plants, spices and condiments for skill development and employability.

CO6: Have the knowledge of non-wood forest products and non-alcoholic beverages for skill development and employability.

CO7: Understand phyto-chemical analysis related to medicinally important plants and economic products produced by the plants for skill development and employability.

CO8: Know about the importance of Medicinal plants and its useful parts, economically important plants in our daily life and also about the traditional medicines and herbs, and its relevance in modern times for skill developmentand employability.

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	1	3	1	2	3	1	1
CO2	1	3	2	1	1	3	1	1
CO3	1	3	3	1	1	1	1	1
CO4	1	1	3	1	2	1	1	3
CO5	1	1	3	1	3	3	1	3
CO6	3	1	1	1	3	3	1	1
CO7	3	1	1	1	3	3	1	1
CO8	3	1	1	1	3	3	1	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	2
CO2	3	1	2
CO3	3	1	1
CO4	3	3	1
CO5	3	3	1
CO6	3	3	1
CO7	3	3	1
CO8	3	3	1

Suggested Readings:

1. AushdhiyePoudhe (Hindi) by R.P. Sharma | 1 January 2013 YKING BOOKS
2. Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4thedition.
3. Sambamurthy, AVSS & Subrahmanyam, NS (2000). Economic Botany of Crop Plants. Asiatech Publishers. New Delhi.
4. Singh, D.K and K.V. Peter. 2014. Protected cultivation of horticultural crops. New India Publishing Agency,India.
5. Reddy P. Parvatha. 2016. Sustainable crop protection under protected cultivation. Springer,Singapore.
6. Amit Deogirikar. 2019. A Text Book on Protected Cultivation and Secondary Agriculture. RajlaxmiPrakashan, Aurangabad,India.
7. Singh, B., B. Singh, N. Sabir and M Hasan. 2014. Advances in protected cultivation. New India Publishing Agency, India.
8. Sharma, OP. 1996. Hill's Economic Botany (Late Dr. AF Hill, adopted by OP Sharma). Tata McGraw Hill Co. Ltd., NewDelhi.
9. Joe J. Hanan. 1997. Greenhouses: Advanced Technology for protected horticulture. CRCPress.
10. Krishnamurthy, K.V. (2004). An Advanced Text rbook of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. NewDelhi
11. N.K. Acharya: Textbook on intellectual property rights, Asia Law House(2001).
12. Manjula Guru & M.B. Rao, Understanding Trips: Managing Knowledge in Developing Countries, Sage Publications (2003).
13. P. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, Tata McGraw-Hill(2001).
14. Arthur Raphael Miller, MichealH.Davis; Intellectual Property: Patents, Trademarks and

Copyright in a Nutshell, West Group Publishers(2000).
15. Jayashree Watal, Intellectual property rights in the WTO and developing countries, Oxford University Press,Oxford.
16. Jain, S. K. and V. Mudgal. 1999. A Handbook of Ethnobotany. Bishen Singh MahendraPalSingh,Dehradun.
17. Jeffrey, C. 1982. An Introduction to Plant Taxonomy. Cambridge University Press,Cambridge.London.
18. Joshi, S. G. 2000. Medicinal Plants. Oxford and IBH, NewDelhi.
19. Kokate, C. and Gokeale- Pharmocognacy- NiraliPrakashan, NewDelhi.
20. Lad, V. 1984. Ayurveda – The Science of Self-healing. Motilal Banarasidass, NewDelhi.
21. Lewis, W. H. and M. P. F. Elwin Lewis. 1976. Medical Botany. Plants Affecting Man's Health.A
22. Wiley Inter science Publication. John Wiley and Sons, NewYork.
23. Farooqui, A. A. and Sreeraman, B. S. 2001. Cultvation of medicinal and aromatic crops. UniversitiesPress.
24. Harborne, J. B. 1998. Phytochemical methods – a guide to modern techniques of plant analysis 3 rd edition, Chapman and Hall.
25. Yesodha, D., Geetha, S and Radhakrishnan, V. 1997. Allied Biochemistry. Morgan publications, Chennai.1. Gurdeep Chatwal, 1980. Organic chemistry of natural productis. Vol. I. Himalaya Publishinghouse.
26. Kalsi, P. S. and Jagtap, S., 2012. Pharmaceutical medicinal and natural product chemistry. N.K. Mehra for Narosa Publishing House Pvt. Ltd. NewDelhi.
27. Wallis, T. E. 1946. Text book of Pharmacognosy, J & A ChurchillLtd.
28. Roseline, A. 2011. Pharmacognosy. MJP Publishers,Chennai.
29. Jain S. K. 1989. Methods and approaches in Ethnobotany, Society of Ethnobotanists,Lucknow.
30. SharolTilgner, N. D. 1999. Herbal medicine - From the heart of the earth.Edn. 1, Printed in the USA by Malloy LithographingInc.
31. Pal, D.C. & Jain, S.K., 1998. Tribal Medicine. Naya Prakash Publishers,Calcutta.
32. Datta & Mukerji, 1952. Pharmacognosy of Indian roots of Rhizoms drugs. Bulletin No.1 Ministry of Health, Govt. ofIndia.
33. Young Ken, H.W., 1948. Text Book of Pharmacognosy. Blakiston C.,Philadelphia.
34. Shukla, R.S., 2000. Forestry for tribal development. A.H. Wheeler & Co. Ltd.,India.
35. Raychudhuri, S.P., 1991. (Ed.) Recent advances in Medicinal aromatic and spice crops. Vol.1, Today& Tomorrow's printers and publishers, NewDelhi.
36. Bajpai, P.K. 2006. Biological Instrumentation and methodology. S. Chand &Co.Ltd.
37. K. Wilson and J. Walker Eds. 2005. Biochemistry and Molecular Biology. Cambridge UniversityPress.
38. k. Wilson and KH Goulding. 1986. Principles and techniques of Practical Biochemistry. (3 edn Edward Arnold, London.

This course can be opted as an elective by the students of following subjects: **Open to all but special for** B.Sc.

Biotech, B.Sc. Forestry, B.Sc. Agriculture, B. Pharma, B.A. (Curators), B.A. Archaeology, B.A. Geology, BAMS

Suggested Continuous Evaluation Methods:

Continuous Internal Evaluation shall be based on allotted Assignment and Class Tests. The marks shall be as follows:

Course prerequisites:

Qualification: To study this course, a student must have qualified 10+2 with Biology/ NSQF level 3 from Sector Skill Councils / Diploma holder from ITI in (Biology/ Agriculture/ Forestry).

Facilities: Smart and Interactive Class

Other Requisites: : Video collection, Books, CDs, Flora, Herbarium, Access to On-line resources, Display Charts
Suggested equivalent online resourses: https://www.pnas.org/content/104/suppl_1/8641https://www.journals.uchicago.edu/doi/pdfplus/10.1086/659998https://bsi.gov.in/page/en/ethnobotany http://www.legalserviceindia.com/article/l98-Intellectual-Property-and-Traditional-knowledge.htmlhttps://www.brainkart.com/article/Economic-importance-Plants---Food,-Rice,-Oil,-Fibre,-Timber-yielding-plant_1095/https://www.loc.gov/rr/scitech/tracer-bullets/economic-botanytb.htmlhttp://nsdl.niscair.res.in/bitstream/123456789/127/1/Fibre%20crops%2C%20bamboo%2C%20timber%20-%20Final.pdfhttps://www2.palomar.edu/users/warmstrong/econpls.htm https://www.longdom.org/proceedings/phytochemistry-and-phytoconstituents-of-herbal-drugs-and-formulations-1668.html

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course II
(Practical)

Programme/Class: **Diploma/ BSc BEd**	Year: **Second**	Semester: **Fourth**
Subject: **Botany**		
Course Code: **B040402P**	Course Title: **Commercial Botany & Phytochemical Analysis**	

Objectives:
The course aims to share the knowledge to the students about the experiments. The students will get a better understanding of the concept studied by them in theory course and correlate with experimental observations for skill development, entrepreneurship and employability.

Credits: **2**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: 40

Total No. of Lectures-Tutorials-Practical (in hours per week): P- 2/**w**

Unit	Topics (Perform minimum any three experiments from each unit)	No. of Lectures
I	**Economic Botany &Microtechniques:** Cereals: Wheat (habit sketch, L.S./T.S. of grain, starch grains, micro-chemical tests); rice(habit sketch, study of paddy and grain, starch grains, micro-chemical tests) Legume: Pea or ground nut (habit, fruit, seed structure, micro-chemicaltests)Source of sugars and starches: Sugarcane (habit sketch; cane juice- micro-chemical tests); potato (habit sketch, tuber morphology, T.S. of tuber to show localization of starch grains, W.M. of starch) grains, micro-chemical tests.Tea- tea leaves, tests for tanninMustard- plant specimen, seeds, tests for fat in crushed seeds Timbers: section of young stem.Jute- specimen, transverse section of stem, tests for lignin on T.S. of stem and study of fiber following maceration technique.Study of specimens of economic importance mentioned in Unit I-& II	8
II	**Commercial Cultivation** Field visit to Green houses for understanding Floriculture & vegetables production Development of hydroponics nutrient solutions & running models for cultivation of vegetables Development of hydroponics nutrient solutions & running models for cultivation of fodder	8
III	**Cultivating Medicinal and aromatic plants & Essential oil extraction** a. Lemon grass/ Neem/ Zinger /Rose/Mint	7
IV	**Documentation from** Traditional nowledge Digital Library, Mark the Geographic Indications on Map, Understand –NakshtraVatika,Navgrahvatika and develop in your college To extract the names of the plants and Botanical uses depicted in our epics. Visit NISCAIR,New Delhi	7

V	**Ethnobotany** Study of common plants used by tribes. *Aegle marmelos, Ficus religiosa, Cynadondactylon.,* Visit a tribal area and collect information on their traditional method of treatment using crude drugs. Familiarizewithatleast5folkmedicinesandstudythecultivation,extractionandits medicinal application. Observe the plants of ethno botanical importance in your area . Visit to an Ayurveda college orAyurvedic Research Institute / Hospital	7
VI	**Instrumentation and herbal Preparations** Develop Capsules of herbs/,Develop Herbal oils/,Develop Poultice/cream Analyse some active ingredients using chromatography /Spectrophotometry.	8
VII	**Pharmacognosy** Organoleptic studies of plants mentioned in the theory : 1. Morphological studies of vegetative and floral parts. 2. Microscopic preparations of root, stem andleaf. 3. Stomatal number and stomatalindex. 4. Vein isletnumber. 5. Palisaderatio. 6. Fibres and vessels(maceration). 7. Starchtest 8. Proteins and lipidtest	8
VIII	**Phytochemistry:** Determination of the percentage of foreign leaf in a drug composed of a mixture of leaves. Dimensions of Calcium oxalate crystals in powdered crude drug. Preliminary phytochemical tests for alkaloids, terpenoids, glycosides, volatile oils, tannins & resins. Any 5 herbal preparations.	7

Course outcomes: After the completion of the course the students will be able to:

CO1: Know about the commercial products produced from plants for skill development, entrepreneurship and employability.

CO2: Gain the knowledge about cultivation practices of some economic crops for skill development, entrepreneurship and employability.

CO3: Understand about the Ethnobotanical details of plants for skill development, entrepreneurship and employability.

CO4: Learn about the chemistry of plants & herbal preparations

CO5: Can become a protected cultivator, aromatic oil producer, Pharmacologist or quality analyst in drug Company for skill development.

CO6: Gain knowledge of food crops with special reference to carbohydrates, protein and fats on the basis of their local name, botanical name, family and their uses for skill development, entrepreneurship and employability.

CO7: Identify and explain some medicinal plants, Fibre yielding plants for skill development.

CO8: Identify the woods in local area with special reference to their local name, botanical name and families to which they belong for skill development.

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	1	3	1	1	3	1	1
CO2	1	3	2	1	1	3	1	1
CO3	1	3	3	1	1	1	1	1
CO4	1	1	3	1	1	1	1	3
CO5	1	1	3	1	1	1	1	1
CO6	1	3	3	1	1	1	3	3
CO7	1	3	3	1	1	1	3	3
CO8	1	3	3	1	1	1	3	3

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	3	2
CO2	3	1	2
CO3	3	2	2
CO4	3	2	2
CO5	3	1	2
CO6	3	2	2
CO7	3	1	2
CO8	3	1	2

Suggested Readings:

1. Plant Ecology And Economic Botany by Dhankar - Sharma - Trivedi, RBDPublication
2. Wallis, T. E. 1946. Text book of Pharmacognosy, J & A ChurchillLtd.
3. Roseline, A. 2011. Pharmacognosy. MJP Publishers,Chennai.
4. Jain S. K. 1989. Methods and approaches in Ethnobotany, Society of Ethnobotanists,Lucknow.
5. Pal, D.C. & Jain, S.K., 1998. Tribal Medicine. Naya Prakash Publishers,Calcutta.
6. Datta & Mukerji, 1952. Pharmacognosy of Indian roots of Rhizome drugs. Bulletin No.1 Ministry of Health, Govt. ofIndia.
7. Young Ken, H.W., 1948. Text Book of Pharmacognosy. Blakiston C.,Philadelphia.
8. Shukla, R.S., 2000. Forestry for tribal development. A.H. Wheeler & Co. Ltd.,India.
9. Raychudhuri, S.P., 1991. (Ed.) Recent advances in Medicinal aromatic and spice crops. Vol.1,Today& Tomorrow's printers and publishers, NewDelhi.
10. Khasim S.M Botanical Microtechniques: Principles andPractice-
11. Sambamurthy, AVSS & Subrahmanyam, NS (2000). Economic Botany of Crop Plants. Asiatech Publishers. New Delhi.

This course can be opted as an elective by the students of following subjects: **Open to all but special for** B.Sc.
Biotech, B.Sc. Forestry, B.Sc. Agriculture, B. Pharma, B.A. (Curators), B.A. Arch,. BAMS

Suggested Continuous Evaluation Methods:
Continuous Internal Evaluation shall be based on allotted Assignment and Class Tests. The marks shall be as follows:

Course prerequisites:
Qualification: To study this course, a student must have qualified 10+2 with Biology/

NSQF level 3 from Sector Skill Councils / Diploma holder from ITI in (Biology/ Agriculture/ Forestry). **Facilities: Smart and Interactive Class** **Other Requisites:** Video collection, Books, CDs, Flora, Herbarium, Access to On-line resources, Display Charts **Lab requisites:** Repository of economic products, Microscopes/ Botanical /Herbal Garden, TLC, Spectrophotometer.
Suggested equivalent online courses: https://www.entrepreneurindia.co/Document/Download/pdfanddoc-144615-.pdfhttp://nopr.niscair.res.in/handle/123456789/45825https://www.wipo.int/export/sites/www/tk/en/resources/pdf/medical_tk.pdfhttps://www.bentoli.com/commercial-farming-agriculture/

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education)
Programme
Course I
(Theory)

Program/Class: Diploma /BSc BEd	**Year:** Second	**Semester:** Fourth
Subject:ZOOLOGY		
Course Code: **B050401T**	Course Title: **Gene Technology and Human Welfare**	

Objective: The course is designed to understand the principles of genetic engineering, how genes can be cloned in bacteria and thevarious technologies involved init. Astrongemphasiswillbelaidonthemoderntoolsandtechniquesusedin biotechnology in various fields like agriculture, industry and humanhealth forentrepreneurship and employability in industries as well as Research Labs.

Credits: **4**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: 40

Total No. of Lectures-Tutorials-Practical (in hours per week): L-**4/w**

Unit	Topics	No. of Lectures
I	**Principles of Gene Manipulation** • Recombinant DNATechnology • Restriction Enzymes, DNA modifying enzymes,CloningVectors,Ligation • Gene transfer techniques, Genetherapy • Selection and identification of recombinantcells	10
II	**Applications of Genetic Engineering** • Single cellproteins • Biosensors,Biochips • Crop and live stock improvement, development oftransge • Development of DNA drugsand vaccines	8
III	**Enzyme Technology** • Microbialculture • Methods of enzymeproduction • Immobilization ofenzymes • Applications,antibiotics	6
IV	**DNA Diagnostics** • Genetic analysis of human diseases, detection ofknown and unknownmutations • DNAfingerprinting • Concept of pharmacogenomics andpharmacogenetics • Personalized medicine—optimizing drugtherapy	6
V	**Biostatistics I** • Calculations of mean, median, mode, variance,standard deviation • Concepts of coefficient of variation, Skewness,Kurtosis	8

	• Elementary idea of probability and application	
VI	**Biostatistics II** • Data summarizing: frequency distribution, graphical presentation—bar, pie diagram, histogram • Tests of significance: one and two sample tests, t-test and Chi-square test	7
VII	**Basics of Computers** • Basics (CPU, I/O units) and operating systems • Concept of homepages and websites, World Wide Web, URLs, using search engines	7
VIII	**Bioinformatics** • Databases: nucleic acids, genomes, protein sequences and structures, Bibliography • Sequence analysis (homology): pairwise and multiple sequence alignments-BLAST, CLUSTALW • Phylogenetic analysis	8

Course outcomes:

The student at the completion of the course will be able to:

CO1: Understand the principles of genetic engineering, how genes can be cloned in bacteria and the

various technologies involved init employability in different industrial sectors.

CO2: Know the applications of biotechnology in various fields like agriculture, industry and human healthemployability in bioreactor industries.

CO3: Know the basics of industrialbiotechnologyfor skill developmentand employability.

CO4: Get introduced to DNA testing and utility of genetic engineering in forensicsciences employability in forensic labs.

CO5: Get introduced to computers and use of bioinformaticstools employability as data scientist.

CO6: Enable students to get employment inpathology/Hospital.

CO7: Take up research in biologicalsciences employability in research labs.

CO8: To understand the various terminologies of Biostatistics for understanding ofentrepreneurial skill.

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): (Please write 3,2,1 wherever required)

Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	3	3	2	2
CO2	2	3	3	2	2	2	3	3
CO3	2	2	1	2	2	2	1	1
CO4	3	2	2	1	2	1	1	2
CO5	2	2	3	3	1	1	1	2
CO6	1	1	1	1	1	1	1	2

CO7	2	1	1	1	1	1	2	2
CO8	3	1	1	1	1	1	1	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	3	2
CO2	1	3	1
CO3	3	3	2
CO4	2	2	1
CO5	2	3	3
CO6	2	3	1
CO7	2	3	2
CO8	2	1	3

Suggested Readings:

1. Primrose & Twyman. Principles of Genome Analysis and Genomics. Blackwell(2003).
2. Hartl& Jones. Genetics: principles &Analsysis of Genes & Genomes. Jones & Bartlett (1998).
3. Sambrook *et al* .Molecular Cloning Vols I, II, III. CSHL (2001).
4. Primrose. Molecular Biotechnology. Panima (2001).
5. Clark & Switzer. Experimental Biochemistry. Freeman (2000)
6. Sudbery. Human Molecular Genetics. Prentice-Hall (2002).
7. Wilson. Clinical Genetics-A Short Course, Wiley (2000).
8. Pasternak. An Introduction to Molecular Human Genetics. Fritzgerald (2000).
9. Biostatistical Analysis (Fourth Edition) by Jerrold H. Zarr, Pearson Education Inc., Delhi.
10. Statistical Methods (Eighth Edition) by G. W. Snecdecor and W. G. Cochran, WilleyBlackwell
11. Biostatistics (Tenth Edition) by W.W. Daniel and C. L. Cross,Wiley
12. Introductory Biological Statistics (FourthEdition) by John E.Havel, Raymond E.Hamptonand Scott J. Meiners
13. Westhead *et al* Bioinformatics: Instant Notes. Viva Books (2003).

Course Books published in Hindi must be prescribed by the Universities and Colleges

This course can be opted as an elective by the students of following subjects:The eligibility for this paper is 10+2 with Biology as one of the subject

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course II
(Practical)

Programme/Class: **Diploma/ BSc BEd**	Year: **Second**	Semester: **Fourth**
Subject: **ZOOLOGY**		
Course Code: **B050402P/R**	Course Title: **Genetic Engineering Lab, Genetic Counselling & Telemedicine**	

Objective: To make the study relevant, interesting, encouraging to the students and to get employment in Hospitals/Diagnostic and forensic labs/Counsel families with geneticdisorders and enable students to take up research in biologicalsciences and to apply knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics existing software effectively to extract information from large databases and to use this information in computermodeling.For skill development, entrepreneurship and employability.

Credits: **2**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: 40

Total No. of Lectures-Tutorials-Practical (in hours per week): **L-T-P:** 0-0-4

Unit	Topics	No. of Lectures
	Part A	
I	1. Measure the pre and post clitellar lengths of earthworms and calculate mean, median, mode, standard deviationetc. 2. Measure the height and weight of all students in the class and apply statisticalmeasures.	**10**
II	1. To perform bacterial culture and calculate generation time ofbacteria. 2. To study Restriction enzyme digestion using teaching kits. 3. To study Polymerase Chain Reaction (PCR) using teachingkits. 4. Demonstration of agarose gel electrophoresis for detection ofDNA. 5. Demonstration of Polyacrylamide Gel Electrophoresis (PAGE) for detection ofproteins. 6. To calculate molecular weight of unknown DNA and protein fragments from gelpictures.	**20**
III	1. To learn the basics of computerapplications 2. To learn sequence analysis usingBLAST 3. To learn Multiple sequence alignment using CLUSTALW 4. To learn about Phylogenetic analysis using the programmePHYLIP. 5. TolearnhowtoperformPrimerdesigningforPCR using available softwares etc.	**15**
IV	Virtual Labs 1. Gel Documentation System- https://youtu.be/WPpt3-FanNE 2. Colorimeter-https://youtu.be/v4aK6G0bGuU 3. PCR Part 1-https://youtu.be/CpGX1UFSl4A 4. PCR Part 2-https://youtu.be/6IcHAYPTAEw 5. DNA isolation Part 1- https://youtu.be/QE7Ul0JnY9A	**15**

	6. DNA isolation part 2-https://youtu.be/-efr_HFeHxM 7. DNA curve-https://youtu.be/ubL8QxTeuG4 8. Spectrophotometer- https://youtu.be/ubL8QxTeuG4 9. Agarose Part 1-https://youtu.be/7gvHPFww--g 10. Agarose part 2-https://youtu.be/j_bOZCHNsSg	

Course outcomes:

The student at the completion of the course will be able to:

CO1: Understand the principles of genetic engineering with hands-on experiments in mutation detection, testing of infectious diseases like Covid19. To get introduced to DNA testing and utility of genetic engineering in forensicsciences.employment in hospitals, research labs.

CO2: Apply knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics existing software effectively to extract information from large databases and to use this information in computermodeling. Bioinformatics tools is use to find out evolutionary/phylogenetic relationship of organisms using gene sequences.employment as data scientist.

CO3: Get employment in Hospitals/Diagnostic and forensic labs/Counsel families with geneticdisorders. Enable students to take up research in biologicalsciences.

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): (Please write 3,2,1 wherever required)

Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	2	3	2	2	2
CO2	3	2	3	1	2	3	3	3
CO3	2	1	1	3	1	1	1	2

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	3	2
CO2	2	3	2
CO3	1	2	1

Suggested Readings:

Primrose & Twyman. Principles of Genome Analysis and Genomics. Blackwell(2003).

1. Hartl& Jones. Genetics: principles &Analsysis of Genes & Genomes. Jones & Bartlett(1998).
2. Sambrook *et al* .Molecular Cloning Vols I, II, III. CSHL(2001).
3. Primrose. Molecular Biotechnology. Panima(2001).

Course Books published in Hindi must be prescribed by the Universities and Colleges

This course can be opted as an elective by the students of following subjects:
The eligibility for this paper is 10+2 from Arts/Commerce/Science

Suggested Continuous Evaluation Methods:

2nd Year, Semester-IV

B.Sc.-B.Ed. (Integrated Education) Programme

Course I

(Theory)

Programme/Class: **Diploma/ B.Sc.B.Ed.**	Year: **Second**	Semester: **Fourth**
Subject: **Teacher Education Course [TEC-4]**		
Course Code: **E030401T**	Course Title: **Structure and Management of School Education inIndia**	

Rationale:

India is divided into 28 states and 08 Union Territories. The States have their own electedgovernments while the Union Territories are governed directly by the Government of India, with thePresident of India appointing an administrator for each Union Territory. As per the Constitution afterIndependence, school education was originally a state subject but after the amendment of 1976,education comes under the Concurrent List. That is, School education policies and programmes aresuggested at the national level through the state governments have a lot of freedom in implementingprogrammes. So, it felt important with the perspective of future teachers that they should know aboutthe system and structure of school education in India.

Credits: **6**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**
Total No. of Lectures-Tutorials-Practical (in hours per week): L- **4-1-1**	Total Contact Hours: **90**

Unit	Topics	No. of Lectures
I	**Development of School Education in India** • Historical perspectives (Ancient, pre and post-Independenceperiod) of development of school education in India • Purpose, functions, and systems of school education in India. • Constitutional provisions and Centre-state relationship regardingschool education in India. • Recommendations of various committees and commission regarding school education: Secondary Education Commission, Kothari Commission, NEP-1968, NEP-1986, Programme of Action, Ramamurti Review Committee, Janardhan Reddy Committee, Yashpal Committee, RMSA (Rashtriya MadhyamikShiksha Abhiyaan), NCF-2005, Ishwari Bhai Patel Committee,NEP-2020	**15L+5T**
II	**Structure of School Education in India** • Structure of School Education • Governance and administration of school education. • Legal and Institutional framework of school education • Problems and issues of school education in India: Equalization ofeducational opportunities, wastage and stagnation, public vs. private schools, rural vs. urban schools • Vocationalisation of school education	**15L+2T**
III	**Institutional Planning in School Education**	**15L+4T**

	• Concept, Scope, and nature of institutional planning • Need and importance of institutional planning • Types of institutional planning • Process of institutional planning • Planning and preparation of academic calendar for school • Evaluation of institutional planning	
IV	**Educational Management** • Management of educational institutions at the school level • Types of school management, effective school management,coordination, supervision, and inspection. • Techniques and skills for effective management in schools. • Management of schools at National Level: Ministry of Education, CABE, NCERT, CBSE, RIE, NIEPA, NCTE, CIET, NIOS,KVS, NVS • Management at State Level: Ministry of School Education, Directorate of School Education, Board of Education, SCERT,SIET, SIEMAT, SRC. • Management at District Level: District Education Administration-DEO, Dy. E.O (ZP), DPO (SSA), DIET. Sub-District Level- URC/BRC/BEO, Representatives from CRC,Innovative teachers. • School Records- Preparation, need, and significance.	**15L+4T**
Research Orientation	**Students will be required to** • Organize a Seminar on Indigenous system of School Education. • Visit any two schools, find out innovative teachers, and prepare aresearch note highlighting their innovative techniques. • Survey one Government and one Private School in your vicinity, and prepare a report on how the national and state agencies areworking for their betterment. • Prepare an academic calendar for any school of your choiceincluding all the important activities conducted by the school in ayear.	**15P**

Course outcomes:

After the completion of this course, the students will be able to

CO1:Understand the development of school education in India

CO2:Know and understand the structure of school education in India

CO3: Develop understanding of institutional planning in school education

CO4**:** Appreciate the role of various institutions and agencies in school education

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): (Please write 3,2,1 wherever required)

Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	2	3	2	2	2
CO2	3	2	3	1	2	3	3	3
CO3	2	1	1	3	1	1	1	2
CO4	1	2	1	1	1	2	1	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	3	2
CO2	2	3	2
CO3	1	2	1
CO4	2	1	1

Suggested Readings:

Government of India (1987). Programme of action. New Delhi: MHRD.

1. Malhotra, P.L.(1986). School education in India: Present status and future needs. New Delhi:NCERT.
2. Mohanty, J. (1999). Educational administration, supervision and school management. NewDelhi: Deep & Deep Publication.
3. Mudhopadyay, S., & Kumar, A. (2001). Quality profiles of secondary schools. New Delhi:NIEPA.
4. NCERT. (2005). National curriculum framework -2005. New Delhi: NCERT.
5. Singhal, R.P. (1983). Revitalizing school complex in India. New Delhi.
6. 'Arya' Mohan Lal (2016) ShaikshikPrashasan Evam Prabandh; Meerut: R. Lal Book Depot.

This course can be opted as an elective by the students of the following subjects: Open for all
……

Suggested equivalent online courses:
……..

Further Suggestions:
……..

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course I
(Theory)
TECEC-2; ENVIRONMENTAL EDUCATION

Course Objectives:
The objective of this course is to familiarize students to create new patterns of behavior of individuals, groups and society as a whole towards the environment.

Course Content:

Unit - I

Environmental Education, Meaning, Status, Features, teaching techniques and importance.

Unit - II

Programmes of environmental education for Primary, Secondary and Higher institutions.
Programmes of environmental education for attitude change among children.

Unit -III

Curriculum and method of teaching for Environmental Education at a primary, secondary and University level. Silent feature of environmental awareness through education.

Unit -VI

Environmental Stressors, Nature and manmade disasters. Role of Educational Institution in Disaster Management. National Efforts of Environmental preservation and improvement. Role of Education in environmental conservation and sustainable development.

Course Outcomes:
Students completing this course will be able to:
CO1: Develop understanding of concept, features and techniques of environmental education
CO2: Understand programmes of environmental education at different levels of education
CO3: Gain knowledge of curriculum and methods of teaching for environmental education
CO4: Comprehend environmental stressors and develop awareness of environmental protection

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs):
(Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	2	3	2	2	2
CO2	3	2	3	1	2	3	3	3
CO3	2	1	1	3	1	1	1	2
CO4	2	1	1	2	1	1	2	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	3	2
CO2	2	3	2
CO3	1	2	1
CO4	2	1	1

Suggested Readings:

1. Mishra, B.D. (1986), Environmental Education, Publication Bureau, Panjab University, Chandigarh.
2. Nanda, V.K. (1997), Environmental Education,Armal Publications, New Delhi.
3. Saxena, A.B. (1996), Education for the Environmental Concerns, Radha Publications, New Delhi.
4. Shandilya, T.K. (ed.) (1985), Population Problem and Development, Deep and Deep Publications, New Delhi.
5. Sharma, R.A. (1998), Environmental Education, R. Lall Book Department, Meerut.
6. UGC (2004), UGC scheme on Population Education 10thPlan guidelines, Non Formal Education.
7. Bureau, UGC, 35 Ferozeshah Road.
8. Yadav, J.S., Sobti, R.C. and Kohli, R.K. (1988), An Elementary Book on Environmental Education, Publication Bureau, Panjab University.

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course II
(Theory)

Programme/Class: **Diploma/ B.Sc.B.Ed.**	Year: **Second**	Semester: **Fourth**
Subject: **Teacher Education Course [EWP-2]**		
Course Code: **E030402P**	Course Title: **Engaging with Pedagogies-2**	

Rationale:

This course will help the students in visualizing and practicing teaching in different situations. Thiscourse will support the students in planning and practicing pedagogies theoretically learned anddiscussed in DSP2 (Discipline-specific pedagogy course-II). This course will offer students variousopportunities to discuss various aspects of teacher and teaching, developing teaching skills,practicing different skills and strategies for teaching, identifying useful resources, creating a joyfullearning environment, and designing assessments in science.

Course outcomes:

After the completion of this course, the students will be able to
CO1: Detail of various aspects of teacher and teaching
CO2: Get mastery in different skills and strategies for teaching
CO3: Plan joyful learning spaces and environment for teaching
CO4: Look after and maximize the use of laboratories in teaching
CO5: Design and develop need-based assessments related to their subjects.

Credits: **3**	Core Compulsory
Max. Marks: **25+75**	Min. Passing Marks: **40**
Total No. of Lectures-Tutorials-Practical (in hours per week): L- **0-0-3**	Total Contact Hours: **45**

Unit	Topics	No. of Lectures
I	**Every student will be required to perform the following activities:** • Managing and writing a reflective diary • Creating engaging teaching-learning environments for teaching,recording the proceedings, and discussing it with peers. • Selecting two transactional strategies of their choice andpracticing them • Learning teaching skills and strategies while practicing insimulated teaching conditions • Identifying five open education resources (OER) and adaptingthem for teaching and learning in your context. • Visiting science laboratories of any University Department andunderstanding its functions. • Designing and developing two assessments each for 'learning ofsubject' and 'learning for subject'.	**45P**

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs): (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	2	3	2	2	2
CO2	3	2	3	1	2	3	3	3
CO3	2	1	1	3	1	1	1	2
CO4	2	1	2	1	2	2	1	1
CO5	1	1	2	1	1	2	1	2

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	3	2
CO2	2	3	2
CO3	1	2	1
CO4	2	2	1
CO5	1	1	1

Suggested Readings:

1. Lefrancois, G. (1991). Psychology for teaching. Wadsworth Publishing Co.
2. Mukunda, K. (2009). What did you ask at school today? A handbook of children's learning.New Delhi: Harper Collins.
3. National Research Council (2000). How people learn: Brain, mind, experience, andschool. Washington, DC: The National Academies Press. Available at:
4. https://doi.org/10.17226/9853.

This course can be opted as an elective by the students of the following subjects: Open for all
……

Suggested equivalent online courses:
……..

Further Suggestions:
……..

2nd Year, Semester-IV
B.Sc.-B.Ed. (Integrated Education) Programme
Course II
(Theory)

Programme/Class: **Diploma/ B.Sc.B.Ed.**	Year:**Second**	Semester: **Forth**
Co-CurricularCourse		
CourseCode:**Z040401**	CourseTitle:**Physical Educationand Yoga**	

Courseoutcomes:

CO1: Students will learn the introduction of Physical Education, Concept of fitness and wellness, Weight managementand lifestyle of an individual.

CO2: The student will also learn about the relation of Yoga with mental health and valueEducation.

CO3: InthiscoursestudentwillalsolearnabouttheaspectsoftheTraditionalgamesofIndia.

Credits: 2	Compulsory
Max.Marks:25+75	Min.Passing Marks:40

TotalNo.ofLectures-Tutorials-Practical(inhoursperweek):L-T-P:2-0-0

Unit	Topics	No.ofLecturesTotal=30
I	**PhysicalEducation:** • Meaning,Definition,AimandObjective. • MisconceptionAboutPhysicalEducation. • Need,ImportanceandScopeofPhysicalEducationintheModernSociety. • PhysicalEducationRelationshipwithGeneralEducation. • Physical Education inIndia beforeIndependence.PhysicalEducationinIndia afterIndependence.	6Theory
II	**ConceptofFitnessandWellness:** • Meaning,DefinitionandImportanceofFitnessandWellness. • ComponentsofFitness. • FactorAffectingFitnessandWellness. **Weight Management:** • MeaningandDefinitionofObesity. • CausesofObesity. • ManagementofObesity. • Healthproblems duetoObesity. **Lifestyle:** • Meaning,Definition,ImportanceofLifestyle. • FactoraffectingLifestyle. • RoleofPhysicalactivityinthemaintainsofHealthyLifestyle.	5Theory 3Practical

III	**YogaandMeditation**: • Historicalaspectofyoga. • Definition,typesscopes&importanceofyoga. • Yogarelationwithmentalhealthandvalueeducation. • YogarelationwithPhysicalEducationandsports. • DefinitionofAsana,differencesbetweenasanaandphysicalexercise. • Definitionandclassificationofpranayama. • Differencebetweenpranayamaanddeepbreathing. • **Practical**:Asana,Suraya-Namaskar,BhujangAsana,Naukasana,Halasana,Vajrasan, Padmasana, Shavasana,Makrasana,Dhanurasana,TadAsana.Pranayam:Anulom,Vilom.	2Theory 6Practical
IV	**TraditionalGamesofIndia:** • Meaning. • TypesofTraditionalGames- Gilli-Danda KancheSta puGutte,et c. • Importance/BenefitsofTraditionalGames. • HowtoDesignTraditionalGames. **RecreationinPhysicalEducation:** • Meaning,DefinitionofRecreation. • ScopeandImportanceof Recreation. • GeneralPrinciplesofRecreation. • TypesofRecreationalActivities. • AerobicsandZumba.(FirIndiaMovement)	2Theory 6Practical

Mapping Course Outcomes (COs) leading to the achievement of Programme Outcomes (POs) (Please write 3,2,1 wherever required)
Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	2	3	2	2	2
CO2	3	2	3	1	2	3	3	3
CO3	2	1	1	3	1	1	1	2

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	3	2
CO2	2	3	2
CO3	1	2	1

SuggestedReadings:

Singh,Ajmer,PhysicalEducationandOlympicAbhiyan,"KalayaniPublishers",NewDelhi,RevisedAddition,2006

Patel,Shrikrishna,PhysicalEducation,"AgrawalPublishers",Agra,2014-15Panday,Preeti,SharirikShikshaSankalan,"KhelSanskritiPrakashan,Kanpur

- KamleshM.L.,"PhysicalEducation,Factsandfoundations",FaridabadP.B.Publications.
- B.K.S.Yengar,"LightandYog.YogaDeepika",GeorgeAllenofUnwinLtd.,London,1981. BrajBilariNigam,YogaPower"TheKpathofPersonalachievement"DomenandPublishers, NewDelhi,2001.
- IndiraDevi,"YogaforYou",Gibbs,SmithPublishers,SaltLakeCity,2002DomenandPublishers,NewDelhi-2001.
- Jack Peter, "Yoga Master the Yogic Powers", Abhishek Publications, Chandigarh,2004.JaniceJerusalim,"AGuideToYoga"ParragonBath,Baiihe-2004.

Suggestedequivalentonlinecourses:

- IGNOU.
- RajarshiTandanOpenUniversity.

Further Suggestions:……..

Study and Evaluation Scheme

Programme: B.Sc.-B.Ed. (4 Years Integrated)
Course Structure

Semester –V								
Course	**Code**	**Subject**	**Title**	**Credit**	**Internal**	**External**		**Total**
						Theory	**Practical**	
PEC 1	BSCBED521		Gender School and Society	4	30	70	--	100
PEC 2	BSCBED522		Pedagogy of Physical Science 1	2	15	35	--	50
PEC 3	BSCBED523		Pedagogy of Mathematics 1	2	15	35	--	50
	BSCBED524		Pedagogyof Biological Science 1	2	15	35	--	50
PEC 4	BSCBED555		**Practicum:** School Attachment Programme 1	4	100	--	--	100
Subjects - As per semester I								
Group – A								
GEC 1	BSCBED531	Chemistry	Transition Elements, Coordination Compounds and Chemical Kinetics	3	30	70	--	100
	BSCBED551		Practical	1	25	--	25	50
Group – B								
GEC 2	BSCBED532	Physics	Atomic and Molecular Physics	3	30	70	--	100
	BSCBED552		Practical	1	25	--	25	50
	BSCBED533	Mathematics	Multivariate Caculus and Vector Calculus	4	30	70	--	100
Group – C								
	BSCBED534		Development Biology, Applied Zoology & Ethology	3	30	70	--	100

GEC 3	BSCBED553	Zoology	Practical	1	25	--	25	50
	BSCBED535	Botany	Botanical Nomenclature, Angiosperm Taxonomy and Utilization of Plants	3	30	70	--	100
	BSCBED554		Practical	1	25	--	25	50
Total Marks (PCM Group)								400
Total Marks (ZBC Group)								450
Total Semester Marks (PCM Group)								***700***
Total Semester Marks (ZBC Group)								***750***

PEC = Professional Education Component (PEC)
GEC = General Education Component (GEC)

Third YEAR

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 70
Internal: 30
Total: 100

BSCBED521: GENDER, SCHOOL AND SOCIETY

Course Objectives:

The purpose of this course is to expose students to:

- Understand the basic terms, concepts used gender study
  Understand the gender discrimination in construction and dissemination of knowledgefor skill development.
- Develop the awareness and sensitivity
- Learn about gender issues in school, curriculum, textual material across disciplines, pedagogical process and gender
- Understand the gradual paradigm sift from women studies to gender studies.

Course Content:

Unit- I

Gender, patriarchy, masculinity and feminism – in cross cultural perspectivesGender bias, gender stereotyping and empowerment, Equity and equality in relation with caste, class, religion, ethnicity, disability and regionfor developing skill.

Unit-II

In the structure of knowledge, in the development of curriculum, gender and hidden curriculum, Gender in text and context (text books inter sectionlity with other disciplines, classroom processes including pedagogy) in the class room, in the management of school, Teachers as agent of changefor skill development.

Unit-III

Sites of conflict: social and emotional Understanding the importance of addressing sexual harassment in family, neighborhood and other formal and informal institutions. Agencies perpetuating violence: family, school, work place and media (print and electronic) Institutions redressing sexual harassment and abusefor skill development.

Unit-IV

Socialization theory, Gender difference theory, Structural theory, Deconstructive theoryfor skill development.

Course Outcomes:

After reading this syllabus student will be able to:

CO1: Understand meaning of gender and the issues related to gender in education in Indian societyfor developing skill and employability

CO2: Examine the issues and concerns related to universalisation of Secondary Education for developing skill and employability

CO3: Understanding different agencies of society in gender biasfor developing skill and employability

CO4: Comprehend some of the key concepts of gender studies which encourage critical thinkingfor developing skill and employability

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	1	1	1	1	1
CO2	1	1	2	1	2	1	2	2
CO3	2	2	1	1	2	3	1	1
CO4	3	2	1	2	1	1	1	2

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

References:

- Chandra, Karuna: Structures and Ideologies, Socialization and education of the girl.
- Kumar, K.: Political agenda of education, New Delhi.

Website Sources:

- http://egyankosh.ac.in/handle/123456789/46084

- http://www.bdu.ac.in/cde/docs/ebooks/BEd/II/GENDER,%20SCHOOL,%20SOCIETY%20AND%20INCLUSIVE%20SCHOOL.pdf

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 35
Internal: 15
Total: 50

BSCBED522: PEDAGOGY OF PHYSICAL SCIENCE-I

Course Objectives:

The objectives of this course are to enable student-teachers to:

- Develop a broad understanding of the principles and procedures used in modern physical science education.
- Develop their essential skill for practicing modern physical science education for developing employability.
- Develop their skills necessary for preparing international accessories.
- Prepare acceptance lesson models which lay down this procedure to the acceptance for preparing designs for lesson so as to develop skills and employability.
- Manage introduction activity in such a way that the vast majority of the learners attain most of the objectives

Course Content:

Unit-I

Nature of Science

Science as a domain of enquiry, as a process of constructing knowledge, Science as a interdisciplinary area of learning. Facts, concepts, principles, law and theories – their characteristics in content of Science (Citing example of each). Contribution of Eminent Scientist; Issac Newton, Dalton, Albert Einestien, Graham Bell, J.C. Bose, C.V. Raman, Vikram Sarabhai, H.J. Bhabha, D.S. Kotharifor developing skill,employability and entrepreneurship.

Unit-II

Aims and Objectives of Teaching Physical Science

General aims and objectives of teaching physical science at secondary and senior secondary school stage, instructional objectives with special emphasis on Bloom's taxonomy, Concept of entering and terminal behaviour, defining desired outcomes (statements of objectives) for different levels of education like primary, upper primary, secondary and senior secondaryfor developing skill and employability.

Unit-III

Methodology of Teaching Physical Science

Methods - Lecture, Demonstration, Lecture-cum Demonstration, Heuristic, project, Laboratory, Problem Solving, Techniques – Team-Teaching, Computer Assistance Teaching, Excursion,

science – museums, science – club, science – fair, science projects, Micro teaching skills-Introduction, Reinforcement, Probing Question, Stimulus variation, Explaining, Black Board-Writing etc, Use of ICT in teaching-learning process of physical sciences with computer-aided methods like-Power Point, Multimedia, Simulation, Softwares, Webinars etcfor developing skill,employability andentrepreneurship.

Course Outcomes:

After completing this course students will be able to :
CO1: Understand science, its domains and contribution of various scientistsfor developing skill,employability and entrepreneurship.
CO2: Understanding of aims and objectives of studying sciencefor developing skill and employability
CO3: Develop skills of making teaching learning process experiential and joyfulfor developing skill, employability and entrepreneurship.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	2	3	3	1	3	2	3
CO2	2	3	3	3	2	3	3	2
CO3	3	2	2	3	2	2	3	3

CO-Curriculum Enrichment Mapping(Please write 3,2,1wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1

References:

1. Bennett, Jeffrey : on teaching Science (print/e-book) Big Kid Science Publication.
2. Chauhan S.S. : Innovation in teaching, Vikas Publication, New Delhi.
3. Das, R.C. : Science teaching in schools, Steerling Publication, New Delhi.
4. Kulshrestha, S.P. : Teaching of Physical Science, R.Lal Book Depot, Meeru.
5. Norman Herr : The source book for teaching Science (e-book/print) Wiley Publication.

6. Pandey, Shashi Kiran : Science teaching, Vani Prakashan, New Delhi.
7. Pathak, R.P. : Teaching skills, Pearson Publication, New Delhi.
8. Rawat, D.C. : Teaching of Science, Vinod Pustak, Agra.
9. Siddiqui, N.N. & Siddiqui, M.N. : Teaching of Science, Doaba House, New Delhi.
10. Singh, R. : Teaching methods in schools, Commonwealth Publication, Delhi..
11. Sood, J.K. : Teaching of Physical Science, Agarwal Publication, Agra.
12. Yadav, M.S. : Objective Science, Anmol Publication, New Delhi.

Website Sources:

- http://egyankosh.ac.in/bitstream/123456789/46799/1/BES-143B2-E.pdf
- https://www.youtube.com/watch?v=d4oi-Q28wbs
- https://www.learningclassesonline.com/2019/09/pedagogy-of-mathematics-in-hindi.html

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 35
Internal: 15
Total: 50

BSCBED523: PEDAGOGY OF MATHEMATICS -1

Course Objectives:

The objectives of this course are to enable the pupil and teacher to:

- Understand and appreciate the uses and significance of mathematics in daily life.
- Learn successfully various approaches to mathematics and to use them judiciously.
- Know the methods of planning instruction for the classroom.
- Prepare curricular activities and organize the library in it as per the needs and develop skills for the same and thus developing employability.
- Appreciate and organize activities to develop aesthetics of mathematics.
- Obtain feedback both about teaching as well as student's learning*to inculcate skill, provide employability ansentrepreprepreneuriel skills*

Course Content:

Unit-I
Entering into the Discipline

Meaning and nature of mathemtics, use and significance of mathematics, Contribution of some great mathematicians - Aryabhatta, Bhaskaracharya, Ramanujam, Euclid, Pythagorus, Rene Decarte, Aims and objectives of teaching mathematics at secondary and senior secondary levels, Objectives of teaching mathematics in terms of behaviour of outcomesfor developing skill,employability andentrepreneurship.

Unit-II
Methodology for Mathematics Teaching

Methods of teaching: Inductive- Deductive, Analytic- Synthetic, Problem solving, Heuristics, Project & Laboratory Method, Techniques of teaching: Oral, Written, Drill, Home-Assignment, Supervised study, and programmed learning technique, Micro teaching skills-Introduction, Reinforcement, Probing Question, Stimulus variation, Explaining, Blackboard Writing etc, Use of ICT in teaching-learning process of mathematics with computer-aided methods like-Power Point, Multimedia, Simulation, Softwares, Webinars etc for developing skill,employability and entrepreneurship.

Unit--III
Developing Lesson Plan, Unit Plan and Material Aids

Lesson plan - meaning, purpose and performa of lesson plan and its rationality, Unit plan–

meaning and purpose of unit plan, Teaching –aids importance and classification, Developing/preparing low cost improvised teaching aids, relevant to local ethos, Application of computer in teaching of mathematics for developing skill,employability and entrepreneurship.

Course Outcomes:

After completing this course students will be able to :

CO1: Understand the nature and characteristics of language of mathematics its need , importance and aims and objectives of its teachingfor developing skill,employability and entrepreneurship.

CO2: Understand the various methods and techniques of teaching mathematics to make teaching learning process experiential and joyfulaccording to local and national needs and for developing skill,employability and entrepreneurship.

CO3: Understanding skill to develop lesson plan and teaching aid to enhance teaching and learningfor developing skill,employability and entrepreneurship.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	1	1	3	2
CO2	2	3	3	2	1	2	2	3
CO3	1	3	3	1	2	2	3	2

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3		1

References:

1. Maheshwari, B.K.: Teaching of Mathematics.
2. Shukla, S.C. :Teaching of Mathematics.
3. Kulshrestha, A. K., Teaching of Mathematics.

Website Sources:

- https://www.youtube.com/watch?v=3xWDOUIlLWs
- https://hi.wikipedia.org/wiki
- www.vkmaheshwari.com
- www.pintrest.com>pin

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 35
Internal: 15
Total: 50

BSCBED524: PEDAGOGY OF BIOLOGICAL SCIENCE-1

Course Objectives:

The objectives of this course are to enable student-teachers to**:**

- Develop broad understanding of principles and knowledge used in biology science.
- Develop their essential skills for practicing biological science.
- Know various approaches and methods of teaching life science.
- Lesson planning of biological science properly.
- Prepare tools for evaluation in biological sciencesto inculcate skill, provide employability ansentreprepreneuriel skills.

Course Content:

Unit-I

Nature, Concepts and Importance

History and nature of biological sciences, Importance of biological science for environment, health and peace, Interdisciplinary linkage of biological science and other school subjects, Value of biological sciences in our lives, Four Indian eminent biologists and their discoveriesfor developing skill,employability and entrepreneurship.

Unit-II

Objectives of Teaching Biological Sciences

General aims and objectives of teaching biology difference between aims and objectives, Bloom's taxonomy of educational objectives, Writing objectives in terms of learning outcomes (behavioural term) for different levels of school teaching VIII, IX and X classes-RCEM approach of writing objectivesfor developing skill,employability and entrepreneurship.

Unit-III

Exploring learning

Inductive and deductive approach, different methods and techniques of teaching biological sciences, Teacher centered approaches-lecture, demonstration, lecture cum demonstration, Child centered approach-project method, heuristic problem solving, assignment, Use of ICT in teaching-learning process of biological sciences with computer-aided methods like-Power Point, Simulation, Softwares, Webinars etc, Micro-teaching skills- Intoduction, Explaining, Probing questioning, Illustration, Stimulus variation, Blackboard writing etc, Analysis of content, preparing unit plan, lesson planfor developing skill,employability and entrepreneurship.

Course Outcomes:

After completing this course students will be able to:

CO1: Develop an understanding of the nature of biology its role and importance of biologyfor developing skill,employability and entrepreneurship.

CO2: Develop understanding about the aims and objectives of teaching sciencefor developing skill,employability and entrepreneurship.

CO3: Develop methods and techniques of making teaching learning process experiential and joyful according to local needsfor developing skill,employability and entrepreneurship.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	2	3	2	3	2
CO2	3	1	2	1	2	1	3	1
CO3	3	1	1	1	1	2	1	2

CO-Curriculum Enrichment Mapping(Pleasewrite 3,2,1wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	1	1

References:

1. Agarwal D.D.: *Modern Methods of Teaching Biology*, New Delhi: Sorup and Sons, 2002.
2. Aggarwal, D. D. (2008). Modern Method of Teaching Biology, Karanpaper Books. New Delhi.
3. Dr. S.C. Kulshreshtha;Teaching of biology.
4. Dr. S.C. Shukla;Teaching of biology.
5. K.Yadav; Teaching of Life Sciences.
6. Mangal S. K.: *Teaching of science*, New Delhi: Arya Book Depot, 1992.
7. Sharma, R.C. (2006). Modern Science Teaching .New Delhi: Dhanpat Rai Publications.
8. Yadav Seema and Singh A.K.*: Teaching of Life Science*, New Delhi: Dominant Publications.
9. Yadav, M.S. (2003) Teaching of Science. New Delhi: Anmol Publications.

Website Sources:

- https://www.learningclassesonline.com/2019/09/teaching-of-biological-science-in-hindi.html
- http://assets.vmou.ac.in/BED125.pdf

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 00
Internal: 100
Total: 100

BSCBED555: PRACTICUM: SCHOOL ATTACHMENT PROGRAMME-I

Course Objectives:
The purpose of this course is to expose students to:

- Developing social and personal skills.
- Developing observation and perception skills for developing employability.
- Adding relevance and meaning to learning.
- Providing first-hand real-world experiences.
- Enhancing motivation and interest in the subjectfor inculcating skills, provide employability and developentreprepreneuriel skills.

Course Content:
- The student teachers will visit the neighbourhood schools for two weeks school Observation (Ten Lessons per Subject) to get acquainted withthe school environment and its functions and processes and submit the report.
- The student teachers will familiarize themselves with school structure and administration.
- The student teachers will visit schools and interact with teachers to know about the assessment practices like CCE, grading patterns and reporting the performance ofstudents and submit the report
- Students will analyse the assessment records and the report cards to study the models of assessment and procedures followed in reporting students' performance. The students will attend the PTA meetings where feedback about students' performance is given by the teachers and submit the report.
- The student teachers will observe minimum 3 classes of regular teachers for understanding the skills and strategies used in teaching by them.
- The student teachers will visit different types of schools such as Government, Government aided and private schools to study their governing norms, regulations and participation in the community.

The student teachers will visit the schools run by community/NGO or other organizations like minority run schools, schools in SC/ST dominated areas, schools inslum areas, special and inclusive schools and submit the reportfor developing skill,employability and entrepreneurship.

Course Outcomes:

After completing the course students will be able to:

CO1: Develop a comprehensive and critical understanding on diversities, disabilities, marginalization and inclusive educationfor developing skill,employability and entrepreneurship.

CO2: Understand obstacles to learning due to discriminatory practices with respect to curriculum, teaching approaches, school organization, and various social and cultural factorsfor developing skill,employability and entrepreneurship.

CO3: Implicit and explicit structures in our schools that act as a hindrance in including all studentsfor developing skill,employability and entrepreneurship.

CO4: Deliver pedagogies, curricula and assessments suitable to various inequalities, diversities and disabilities in Indian classroomfor developing skill,employability and entrepreneurship.

CO5: Develop an understanding of Technicality of Teaching rolesfor developing skill,employability and entrepreneurship.

CO6: Curriculum Analysis helped in planning for classesfor developing skill,employability and entrepreneurship.

CO7: Involveand interact with the school activities and were accountable for the samefor developing skill,employability and entrepreneurship.

CO8: Understand the psycho-social needs of childrenfor developing skill,employability and entrepreneurship.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	2	3	1	2	1	3	1
CO2	1	1	2	1	2	2	2	1
CO3	2	2	1	2	1	1	1	2
CO4	3	2	2	3	2	1	1	2
CO5	2	1	2	2	1	2	1	2
CO6	1	1	2	1	1	2	2	1
CO7	3	1	1	2	1	2	2	1
CO8	1	2	1	2	1	1	2	1

CO-Curriculum Enrichment Mapping(Please write 3,2,1wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
CO6	3	2	1
CO7	3	2	1
CO8	3	2	1

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 70
Internal: 30
Total: 100

BSCBED531: TRANSITION ELEMENTS, COORDINATION COMPOUNDS AND CHEMICAL KINETICS

Course Objectives:

The purpose of this course is to expose students to:

- Develop an understanding of Transition elements, Coordination compounds and Chemical kinetics.
- Know the most common structures observed for metal complexes.
- Predict the relative stabilities of metal complexes with different ligands.
- Describe the structures of complexes containing monodentate and polydentate ligands
- Use standard nomenclature rules to name coordination compounds
- Identify several natural and technological occurrences of coordination compounds*to inculcate skill, provide employability ansentreprepreneuriel skills.*

Course Content:

Unit-I

d-block and f-block elements

To relate the electronic configuration to the properties and structure of transition metals andtheir compounds. Characteristic properties of d-block elements.Properties of the elements of the first transition series, their binary compounds and complexesillustrating relative stability of their oxidation states, coordination number and geometry.Position of lanthanides and actinides in the periodictable, lanthanide contraction and its consequences, spectral and magnetic properties oflanthanides, General properties of actinides:for developing skill,employability and entrepreneurship.

Unit- II

Coordination Compounds

To apply theories that explain certain properties and structure of transition metal complexes.Werner's coordination theory and its experimental verification, nomenclature of coordinationcompounds, isomerism in coordination compounds, valence bond theory of transition metalcomplexes. Limitations of VBT. Elementary treatment of crystal field theory, splitting of dorbitalsin square planar, tetrahedral and octahedral complexes, factors affecting crystal fieldparameters, Explanation of magnetic behavior and color of complexes using CFT, effectiveatomic number conceptfor developing skill,employability and entrepreneurship.

Unit-III

Chemical Kinetics

Understanding the factors that influence a chemical reaction and rationalising them on thebasis of known theories of reaction rates. Chemical kinetics and its scope, rate of a reaction,factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light,catalyst. Concentration dependence of rates, mathematical characteristics of simple chemicalreactions – zero order, first order, second order, pseudo order, half life and mean life.Determination of the order of reaction – differential method, method of integration, methodof half-life period and isolation method.Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy,Simple collision theory based on hard sphere model, transition state theory (equilibriumhypothesis). Expression for the rate constant based on equilibrium constant andthermodynamic aspects for developing skill,employability and entrepreneurship.

Unit-IV

Surface Phenomena

Adsorption: Introduction-Absorption and adsorption(definition, examples and differences)types of adsorptions-physical and chemical(definition, examples and differences betweenthem), factors influencing the adsorption of gases on solids. Adsorption isotherms: definition,Mathematical expression for Freundlich and Langmuir's adsorption isotherms. Applicationsof adsorptions.

Catalysis: Definition, general characteristics, action of catalytic promoters and inhibitors.Homogeneous catalysis (definition and examples),Heterogeneous catalysis(definition andexamples) mechanism of heterogeneous catalysis(based on adsorption theory) enzymecatalysis (definition and examples) Mechanism of enzyme catalysed reaction(lock and keymechanism)for developing skill,employability and entrepreneurship.

Course Outcomes:

The students will be able to:

CO1: Explain the fundamental concepts in coordination chemistry of transition metalsfor developing skill,employability and entrepreneurship.

CO2: Understand rate of reaction and factors affecting itfor developing skill,employability and entrepreneurship.

CO3: Derive integrated rate expressions for zero order, first order,second order and third orderreaction.Understand theories of reaction kinetics and differentiate themfor developing skill,employability and entrepreneurship.

CO4: Understand about recently lanthanides have been used inlasers.Knowabout actinides elements are used as nuclear fuels for various purposesfor developing skill,employability and entrepreneurship.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	2	2	1	2	1	1	1
CO2	2	1	2	2	1	2	2	2
CO3	1	2	1	1	1	1	1	1
CO4	2	1	2	2	1	2	2	2

CO-Curriculum Enrichment Mapping(Please write 3,2,1wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	1	1

References:

1. Inorganic Chemistry: James Huhey.
2. Essentials of physical chemistry ArunBahl, B.S. Bahl,G.D. Tuli.
3. Concise Inorganic Chemistry J.D.Lee 5th edition, Wiley publishers.
4. Advanced Inorganic Chemistry SatyaPrakash G.D. Tuli S.K. Basu, R.D. Madan.
5. S.Chand and company pvt. Ltd.
6. Principles of Physical Chemistry Puri, Sharma and Pathania.

Website Sources:

- https://www.gopracticals.com/basic-engineering/
- https://edu.rsc.org/resources/practical
- https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 25
Internal: 25
Total: 50

BSCBED551: PRACTICAL (CHEMISTRY)

Course Objectives:

The objectives of this course are:

- To emphasize the applications of chemistry practical for developing skills in day today life.
- To take into account appropriate methods of physical parameter analysis .
- To address the principles of physical and analytical chemistry and specific topics relevant to various disciplines*for inculcating skills, provide employability and entrepreneurship.*

Course Content:

1. Iodination of Acetone by titration and Colorimetry.
2. Acid Hydrolysis of Ester
3. Reaction between Potassium Peroxydisulphate and Potassium Iodide.
4. Base Hydrolysis of an Ester by Titration and Conductometry
5. Iodine clock reaction
6. Solvolysis of Tertiary Butyl Chloride by Titrimetry, conductometry and pH metry
7. Inversion of Cane Sugar
8. Colorimetric study of kinetics of oxidation of Indigo carmine by Chloromine-T.
9. To study the adsorption of acetic acid on activated charcoal
10. To determine the relative strength of Hydrochloric acid and sulphuric acid by studyingthe kinetics of hydrolysis of ethyl acetate.
11. To study kinetically the reaction rate of decomposition of iodine by hydrogen peroxide.
12. Determination of Copper by colorimetric method using ammonia as the complexingagent.
13. Determination of Ferric ion by colorimetric method using potassium thiocyanate as thecomplexing agent.
14. Estimation of Manganese in pyrolusite by volumetric method
15. Preparation of a complex: potassium trioxalatoaluminate(III) trihydrate or potassiumtrioxalatocobaltate(III)

16. To determine the rate constant for the inversion of sucrose using polarimeterfor developing skill,employability and entrepreneurship.

Course Outcomes:

Students are able:

CO1: To know preparation of a complexfor developing skill, employability.

CO2: To prepare inorganic complex compound of industrial applicationsfor developing skill, employability.

CO3: To know the colorimetric methodfor developing skill, employability and entrepreneurship.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	2	1	2	1	2
CO2	1	1	2	1	1	1	1	2
CO3	2	2	1	2	1	2	1	1
CO4	2	1	1	1	2	1	2	1

CO-Curriculum Enrichment Mapping(Please write 3,2,1wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	1	1

References:

1. A Text Book of Quantitative Inorganic Analysis, A I Vogel.
2. Systematic Experiments in Chemistry ArunSethi New Age International (p) Ltd. Cochin.

Website Sources:

- https://www.gopracticals.com/basic-engineering/
- https://edu.rsc.org/resources/practical
- https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 70
Internal: 30
Total: 100

BSCBED532: ATOMIC AND MOLECULAR PHYSICS

Course Objective:

The goal of this course is to study basics of atomic and molecular Physics that are needed for explaining optical emission spectra of atoms and molecules so as to develop skills for the same and employability.

Course Content:

Unit- I

Inadequacy of Bohr atomic model, correction due to finite mass of thenucleus, Rydberg constant in terms of reduced mass, Excitation and Ionization potentials,Franck-Hertz experiment, Bohr-Sommerfeld Model of atom, relativistic mass correction,vector model of an atom, Electron spin, space quantisation, magnetic moment of an electrondue to its orbital motion. Stern-Gerlach experiment and its theoryfor developing skill andemployability.

Unit -II

Spin-orbit interaction and Fine structure of spectral lines. Quantum numbers and selectionrules. Pauli's exclusion principle. Electronic configuration of atoms. Valence electron and abrief mention of L-S and J-J coupling for multi electron atoms for developing skill andemployability.

Unit -III

Fine structure lines of SodiumZeeman effect. Explanation of Zeeman Effect on the basis of vector model of atom,Expression for Zeeman shift and experimental details. Mention on anomalous Zeeman effect,A qualitative mention of Paschen – Back and Stark effectsfor developing skill andemployability.

Unit- IV

Molecular formation, the molecular ion, H_2 – molecule. Salient features of molecular spectra.Rotation, vibration and electronic spectra of molecules, associated quantum numbers andselection rules. Theory of pure rotation and rotation- vibration spectra, Raman and Infrared(IR) spectra, simple applications for developing skill andemployability.

Course Outcomes:

Students completing this course will be able to:

CO1: Motivate the necessity of using quantum mechanics calculations for describing atomic and molecular processesfor developing skill andemployability.

CO2: Difference between atomic emission spectroscopy and atomic absorption spectroscopyand Atomic spectrum. Understand Atomic emission/ absorption spectroscopyfor developing skill andemployability.

CO3: Describe Zeeman's effect, Paschen back effect and Stark effectfor developing skill andemployability.

CO4: Understand Molecular spectroscopy, and Lande splitting factor.Explain Molecular Spectra of diatomic molecules.Differentiate between Vibrational and Rotational energy levelsfor developing skill andemployability.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	1	3	1	2	2
CO2	2	2	2	1	2	2	2	1
CO3	2	2	1	2	2	2	1	1
CO4	1	3	1	2	1	2	3	3

CO-Curriculum Enrichment Mapping(Please 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

References:

1. H. S. Mani and G. K. Mehta, Introduction to Modern Physics, Affiliated East-West Press, India, 1990.
2. Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc., US; International edition edition.
3. J.R. Taylor, C.D. Zafiratos, Modern Physics, M.A. Dubson, PHI Learning, 2009.
4. R.A. Serway, C.J. Moses, and C.A.Moyer, Modern Physics, Cengage Learning, 2005.
5. G. Kaur and G.R. Pickrell, Modern Physics, McGraw Hill, 2014.
6. Rich Meyer, Kennard, Coop, Introduction to Modern Physics, Tata McGraw Hill, 2002.
7. R. Murugeshan and K. Sivaprasath Modern Physics, S. Chand Publisher, 1994.
8. J. R. Reitz, F. J. Milford, and R. W. Christy, Foundations of Electromagnetic Theory, Addison-Wesley; 4 editions, 2008.

Website Sources:

- https://courses.lumenlearning.com
- https://www.khanacademy.org
- https://en.wikipedia.org
- https://arshadnotes.files.wordpress.com
- https://sahussaintu.files.wordpress.com
- https://www.britannica.com

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 25
Internal: 25
Total: 50

BSCBED552: PRACTICAL (PHYSICS)

Course Objective:

The main goal of this course is to provide knowledge to the students about the Experiments. The students will get a better understanding by performing various experiments like hybrid parameters of transistors, LDR, Zener diode and UJT etc for the development of skills and employability.

Course Content:
List of Experiments

1. Measurement of Hybrid parameter of a transistor.
2. To study the resonance in series LCR circuit with source of given frequency (A.C. mains).
3. To study and Plot the characteristic of L.D.R.
4. To study the FET amplifier in CS configuration.
5. To study the integrator circuit and observe the effect of RC upon fixed time form.
6. To draw the characteristic of Zener diode in reverse and forward bias voltage.
7. To measure certain UJT parameters and study the operation of UJT relaxation oscillator.
8. To Study the ripple factor in a d.c power supply.
9. To study the characteristics of a Tunnel diode.
10. To study emitter follower/ Darlington pair amplifierfor the development of skills and employability

Course Outcomes:

Students completing this course will be able to:

CO1: Measure hybrid parameters of transistorsfor the development of skills and employability

CO2: Study characteristics of L.D.R., FET, Tunnel diode and Zener diodefor the development of skills and employability

CO3: Evaluate ripple factor of dc supplyfor the development of skills and employability.

CO4: Calculate UJT parametersfor the development of skills and employability.

References:

1. Practical Physics by Navneet Gupta.
2. Practical Physics by S. K. Gupta.
3. Hand book of Electronics by Gupta Kumar.
4. Practical Physics by S. L. Gupta.

Website Sources:

- http://www.iiserpune.ac.in
- http://vlab.amrita.edu
- https://www.niser.ac.in

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 70
Internal: 30
Total: 100

BSCBED533: MULTIVARIATE CALCULUS & VECTOR CALCULUS

Course Objectives:

The main aims of this course are to help for finding the integrals of multivariable functions viz. double and triple integrals with their applications, properties like gradient, divergence,curl associated with derivatives of vector point functions and integrals of vector point functions to enhance skills ad develop employability and entrepreneurship.

Course Content:

Unit- I

Definition of a line integral and basic properties, Evaluation of line integrals, Definition ofdouble integral, Conversion to iterated integrals, Evaluation of Double integral, change ofvariables, Surface areas. Definition of a triple integral, Evaluation, Volume as a Tripleintegral to inculcate skill and develop employability.

Unit -II

Improper integrals of the first and second kinds, Convergence, Gamma and Beta functions,Connection between Beta and Gamma functionsfor the development of skills and employability

Unit- III

Quadratic Curves, surfaces, sphere, cylinder, cone, Ellipsoid, Hyperbloid, Paraboloidfor the development of skills and employability

Unit -IV

Vectors, Scalars, Vector field, Scalar field, Vector differentiation, The Vector Differentialoperator del, gradient, curl, Vector integration, The Divergence theorem of Gauss, Stoke'sTheorem, Green's Theorem in plane (without proof) to develop skills and employability.

Course Outcomes:

This course will enable the students to:

CO1: Understand the basic concepts and know the basic techniques of differential and integral calculus of functions of several variables

CO2: Apply the theory to calculate the gradients, directional derivatives, arc length of curves, area of surfaces, and volume of solidsfor the development of skills and employability

CO3: Solve problems involving maxima and minima, line integral and surface integral, and vector calculusfor the development of skills and employability

CO4: Develop mathematical maturity to undertake higher level studies in mathematics and related fieldsfor the development of skills and employability.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	1	2	1	2	1
CO2	2	1	2	2	1	2	2	2
CO3	1	2	1	2	2	2	2	2
CO4	1	2	1	3	1	2	3	2

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

References:

1. Advanced Calculus by David Widder, Dover Publications Inc.
2. Calculus – Single and Multivariable by Hughes Hallet, Wiley.
3. Calculus and analytic geometry by Thomas and Finny, Pearson Education India.
4. Calculus by Lipman Bers, Vols 1 and 2, IBH.
5. First Course in Calculus by Serge Lang, Springer.

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 70
Internal: 30
Total: 100

BSCBED534: DEVELOPMENTAL BIOLOGY AND APPLIED ZOOLOGY AND ETHOLOGY

Course Objective:

The main aim of the paper on Developmental Biology is to provide the undergraduate students an in-depth knowledge on the embryonic and post embryonic developmental processes. An important aspect of developmental biology is its implication in medicine which is also dealt with in this course. The economic impact of the organisms is often huge and that makes it even more important to study themand develop skills of the same and thus developing employability.

Course Content:

UNIT- I

GAMETOGENESIS AND DEVELOPMENT-I

a) **Gametogenesis**–Structure and types of sperm, Spermatogenesis; Structure and types of eggs, Oogenesis
b) **Fertilization**– Types, mechanism and its significances. Parthenogenesis
c) **Cleavage**– Characters, types, patterns of cleavage, planes of cleavages, factors influencing cleavage.
d) **Gastrulation:** Morphogenetic movements
e) Organizer phenomenon– Organizer concept of Spemann, induction; competence, determination and differentiationfor the development of skills and employability

UNIT- II

DEVELOPMENT-II

a) Development of chick up to three germ layers and neurulation.
b) Salient features of chick embryos of different ages – 18 hrs, 24 hrs, 33 hrs and 48 hrs, 72 hrs and 96 hrs of incubation
c) Extra-embryonic membranes of chick – development, structure and functions of amnion, chorion, yolk sac and allantois
d) Placenta in mammals– Structure, classification and typesfor the development of skills and employability

UNIT- III

APPLIED ZOOLOGY

a) **Beneficial animals**: Basic principles: i) Sericulture ii) Apiculture iii) Aquaculture - fish, prawn and shell fish.

b) Harmful animals: Pests – morphology, life cycle, damages caused and control measures of common insect pests of stored food grains and crops, nematode pests of crops, insect vectors (each two); Control – biological control (pheromone traps) andintegrated pest management (IPM)for the development of skills and employability.

UNIT- IV

ETHOLOGY

Definition and objectives of Ethology; Concept of motivation and releaser in behaviour;Innate behaviour, taxes, reflexes, instinctive behaviour (3); Learning, imprinting and itssignificance; biological clocks; Social behaviour in honey bees and monkey; Aggressive behaviourfor the development of skills and employability

Course Outcomes:

Upon completion of the course, students should be able to:

CO1: Understand the events that lead to formation of a multicellular organism from a single fertilized egg, the zygote for the development of skills and employability

CO2: Acquire basic knowledge of the cellular processes of development and the molecular mechanisms underlying these

CO3: Describe the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multicellular organismsfor the development of skills and employability

CO4: Develop skills and realize significance of diagnosis of parasitic attackand treatment of patient or hostfor the development of skills and employability

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	1	2	3	1	1	1
CO2	2	2	1	1	3	2	1	1
CO3	2	2	2	1	2	2	1	2
CO4	1	2	2	1	1	2	2	1

CO-Curriculum Enrichment Mapping(Please write 3,2,1wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

References:

- Developmental Biology by K.V.Sastry& Vinita Shukla – (Rastogi Publications, 2008).
- Introduction to Embryology by B.I. Balinsky – (W.B. Saunders, Philadelphia).
- A Hand Book of Sericulture by Iyonemura&M.N.RamaRao.
- Bee keeping by J.E.Eckert and F.R.Shaw.
- Economic Zoology by G.S. Shukla & V.B. Upadhya.
- Chordate Embryology by Verma P.S &Agarwal VK – Chand & Co.
- Animal Behaviour by V.G.Dethier and E. S. tellar -(Prentice hall of India, New Delhi).
- The study of Instinct by N Tinbergen.
- The Dancing Bees by K V Frisch.

Website Sources:

- https://en.wikipedia.org/wiki/Developmental_biology#:~:text=Developmental
- https://microbenotes.com/category/developmental-biology/

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 25
Internal: 25
Total: 50

BSCBED553: PRACTICAL (ZOOLOGY)

Course Content:

The approach of this paper is to make the students realize the most fascinating aspect of developmental biology that a single fertilized egg can give rise to a fully developed complex organism. The course explains the basic principles and concepts underlying the developmental processes at the level. The course shall surely skill the students to see, appreciate and understand the diversities of parasites in the whole spectrum of the study of life. The course shall also make the students aware about the possible scopes of the subject which include research and applied aspects including entrepreneurial worksto inculcate skill, provide employability ansentreprepreneuriel skills.

Course Content:

1. Study of different types of eggs (Insect, Frog, Hen).
2. Study of permanent slides of different developmental stages in Frog
   a) egg, b) early cleavage, c) morula, d) blastula, e) gastrula.
3. Study of permanent slides/different developmental stages of a) neural plate, b) neural fold, c) Early tadpole, d) hind limb stage, e) hind limb and fore limb stage, f) shorttailed stage, g) young Frog.
4. Preparation of window on hen's egg to study development of embryo.
5. Incubation of fertilized egg of chick, preparation of permanent mounting of embryofrom incubated egg and identification of age of the embryo.
6. Study of permanent slides of chick embryos of
   a) 18 hrs, b) 24 hrs, c) 33 hrs, d) 48 hrs of incubation
7. Study of common insect pests of stored grains and crops.
8. Study of common insect vectors.
9. Study of economically important
   a) Fishes, b) crustaceans, c) molluscans.
10. Study of Preferences: a) Preening behaviour in birds, b) Photo–, chemo–, andGeotaxes in *Drosophila*
11. Stimuli eliciting aggressive displays in male Siamese fighter fish; b) colour change infemale Siamese fighter fish
12. Experiments with maze for studying behavioural motivation in rat.

13. **Sericulture Project –** Moriculture, Collection of laying, incubation, black boxing, brushing, rearing, moulting, spinning, harvesting cocoons, reeling, raw silk (study of some economic traits – fecundity, larval duration, cocoon weight, shell weight and silk weight)for the development of skills and employability

Course Outcome:

Upon completion of the course, students should be able to:

CO1: Discuss the general mechanisms involved in morphogenesis and to explain how different cells and tissues interact in a coordinated way to form various tissues and organs for the development of skills and employability

CO2: Understand about the evolutionary development of various animalsfor the development of skills and employability

CO3:Develop skills and realize significance of diagnosis of parasitic attackand treatment of patient or host for fulfilling local needsand for the development of skills and employability

References:

1. A manual of practical zoology: biodiversity, cell biology, genetics & developmental biology part 1 (M.M. Trigunayat).

Website Sources:

- https://ocw.mit.edu/courses/biology/7-22-developmental-biology-fall-2005/index.htm
- https://embryology.med.unsw.edu.au/embryology/index.php/Main_Page

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 70
Internal: 30
Total: 100

BSCBED535: BOTANICAL NOMENCLATURE, ANGIOSPERM TAXONOMY AND UTILIZATION OF PLANTS

Course Objective:

The objective of this course is to enhance the knowledge of the students about the flowering plants, their classification, nomenclature, herbarium and botanical gardens. The students will also learn about the botanical description, cultivation and economic importance of some food crops, oil yielding plants, fiber yielding plants, medicinal plants and timber yielding plantsto inculcate skills, provide employability andentreprepreneuriel skills.

Course Content

Unit- I

ICBN, principles and aims; type concept, concept of genus and specific epithet, Principle ofpriority, units of classification.

Brief account of regional, national and international herbaria, significance of herbaria;identification keys and floras.

An outlines of artificial, natural andphylogenetic systems of classification.Salient features and outline classification of Bentham and Hooker and Hutchinsonfor the development of skills and employability

Unit- II

Study of the diagnostic features, salient vegetative and floral characteristics and economicallyimportant plants of following families: i)Ranunculacee ii)Cucurbitacae, iii)Malvaceae, iv) Fabaceae, v)Rutaceae, vi)Apiaceae, vii)Euphorbiaceae, viii)Amarantaceaefor the development of skills and employability

Unit- III

Study of the diagnostic features, salient vegetative and floral characteristics and economicallyimportant plants of following families: i) Apocyanaceae ii)Asclepiadaceae, iii)Solanaceae, iv)Liliaceae, v)Poaceaex, vi)Arecaceaefor the development of skills and employability

Unit -IV

Brief account (botanical name, family, extraction/ processing where necessary) and uses of

the following :

a) Cereals and Pulses: Rice, wheat, maize, millets, pigeon, pea, Bengal gram, green gram,black gram.

b) Fibres: Cotton, jute, linen, coir.
c) Vegetable oils: Groundnut, coconut, sunflower, safflower, castor.
d) Timber and bamboos: Rosewood, teakwood, honne, canes and bamboos.
e) Beverages: coffee, tea, cocoa.
f) Spices and condiments: General account, cardamom, clove, pepper, ginger, cinnamon,saffron, turmeric, mustard.
g) Rubber: Hevea, Ficus.

Medicinal plants: Brief account of ethnobotany, uses of Cinchona, Rauwolfia, Poppy, Ashwagandha and Gheekwarfor the development of skills and employability

Course Outcomes:

Students who successfully complete this course will be able to know:

CO1: What is the role of ICBN in plant taxonomy? What are different data sources in Classification of flowering plants?

CO2: What are different methods of naming plants? What are different principles of nomenclature? Why name changes?

CO3: What are artificial, natural and and phylogenetic systems of classification for the development of skills and employability.

CO4: What are different methods of collecting and preserving plants? What is the importance of maintaining plants in botanic gardens? for the development of skills and employability.

CO5: Comparison among different flowering plants groups.Learn the importance of plant of different plantsfor the development of skills and employability

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	2	1	3	1	1
CO2	2	2	2	1	2	2	1	3
CO3	1	2	3	1	2	2	2	
CO4	2	2	1	1	3	3	2	2

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1

CO3	3	2	1
CO4	3	2	1
CO5	3	2	1

References:

1. Davis, P.H. and V.H.Heywood, 1963, Principles of Angiosperm Taxonomy, Oliver and Boyd, London.
2. Heywood, V.H. and D.M.Moore (Ed.) 1984, Current concepts in Plant Taxonomy, Academic Press, London.
3. Hutchinson, J., The families of Flowering Plants, Clarendon Pres, Oxford.
4. Jones, A.B. and A.Luchsinger, 1979, Plant Systematics, McGrow Hill Book Co., New York.
5. Kochhar S.L.1981, Economic Botany in the Tropics, MacMillan India Litd., Delhi.
6. Lawrence, G.H.M. 1950 Taxonomy of Vascular Plants, MacMillan, London.
7. Priti Shukla and Misra, 1988, Taxonomy of Angiosperms, Vikas Publishing House, New Delhi.
8. Singh V. and D.K.Jain, 2005, Taxonomy of Angiosperms, Rastogi Publications, Meerut.
9. Singh, G.1999, Plant Systematics: Theory and Practice, Oxford and IBH Pvt. Ltd., New Delhi.
10. Stace, C.A. 1989, Plant Taxonomy and Biosystematics (2nd Ed.), Edward Arnold, London.
11. Vashista P.C. 1980, Taxonomy of Angiosperms, Sultanchand& Co., New Delhi.

Website Sources:

- http://www.equisetites.de
- https://www.science.gov
- www.pdfdrive.com/botany-books.html
- *www1.biologie.uni-hamburg.de*
- www.pdf.com
- *en.wikipedia.org*
- *onlineecourses.nptel.ac.in*
- www.yourarticlelibrary.com
- www.freebookcentre.net

www.nativeplants.org

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- V

External: 25
Internal: 25
Total: 50

BSCBED554: PRACTICAL (BOTANY)

Course Objective:

This course aims to familiarize the students with technical terms and their definitions, preparation of herbarium and to enhance the knowledge about the medicinal significance of the indigenous plants*to inculcate skills, provide employability ansentrepreprepreneuriel skills.*

Course Content:

1. Study of selected technical terms and their definitions (used in the description of plant).
2. Detailed study of at least one plant specimen per family as given in theory syllabus.
3. Submission of herbanium collection of at least 25 local wild plants.
4. To recognize the botanical name, family, part used and products of economic importance as per theory syllabus;
5. Preparation and submission of an illustrated inventory of 5 medicinal plants used in indigenous systems of medicine and allopathy (Write their botanical name, family, part used, active principle and diseases/disorders for which they are prescribed)for the development of skills and employability

Course Outcomes:

The students completing this course will be able to:

CO1: Have knowledge of taxonomic terms and plants identification as well as their economic importance for the development of skills and employability

CO2: Develop the skill of collection and preservation of plant specimens for the development of skills and employability

CO3: Study the different food crops, plants fibers, medicinal plants and timber yielding plants for the development of skills and employability

References:

1. A text Book of Practical Botany2 by Bendre and Kumar.
2. Modern Practical Botany Vol. III by B.P. Pandey.
3. Practical Botany II by O.P Sharma.

Website Sources:

- https://oer.galileo.usg.edu
- **http://www.biologycorner.com**

Semester –VI								
Course	**Code**	**Subject**	**Title**	**Credit**	**Internal**	**External**		**Total**
						Theory	**Practical**	
PEC 1	BSCBED621		Creatting an Inclusive School	4	30	70	--	100
PEC 2	BSCBED622		Pedagogy of Physical Science 2	2	15	35	--	50
PEC 3	BSCBED623		Pedagogy of Mathematics 2	2	15	35	--	50
	BSCBED624		Pedagogyof Biological Science 2	2	15	35	--	50
PEC 4	BSCBED655		**Practicum:** School Attachment Programme 2	4	100	--	--	100
Subjects - As per semester I								
Group – A								
GEC 1	BSCBED631	Chemistry	Organic Chemistry II	3	30	70	--	100
	BSCBED651		Practical	1	25	--	25	50
Group – B								
GEC 2	BSCBED632	Physics	Classical and Quantum Mechanics	3	30	70	--	100
	BSCBED652		Practical	1	25	--	25	50
	BSCBED633	Mathematics	Groups and Rings	4	30	70	--	100
Group – C								
GEC 3	BSCBED634	Zoology	Animal Physiology, Endocrinolgy & Immunology	3	30	70	--	100
	BSCBED653		Practical	1	25	--	25	50
	BSCBED635	Botany	Plant Physiology and Metabolism	3	30	70	--	100
	BSCBED654		Practical	1	25	--	25	50
Total Marks (PCM Group)								400
Total Marks (ZBC Group)								450
Total Semester Marks (PCM Group)								***700***
Total Semester Marks (ZBC Group)								***750***
Total Third Year Marks (PCM Group)								***1400***
Total Third Year Marks (ZBC Group)								***1500***

PEC = Professional Education Component (PEC)
GEC = General Education Component (GEC)

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 70
Internal: 30
Total: 100

BSCBED621: CREATING AN INCLUSIVE SCHOOL

Course Objectives:

The purpose of this course is to expose studentsknowledge and develop entrepreneur skills to:

- Understand the concept and nature of inclusive education.
- Understand the global and national commitments towards the education of children with diverse needs.
- Prepare conductive teaching learning environment in inclusive schools.
- Identify and utilize existing resources for promoting inclusive practices.

Course Content:

Unit I Basic Concepts and Introduction to Inclusive Educationfor skill development

Meaning of Impairment, Disability and Handicap; Concept of Special Educational Needs andDiverse Needs, Difference between Special Education, Integration and Inclusive Education.Significance of Inclusive Education; Factors Affecting and Promoting Inclusion.

Unit II Nature and Needs of Diverse Learners-Identification of Diverse Learners in the Classroom

Sensory Impairment: Hearing impairment and Visual impairmentPhysical Disabilities: Orthopaedic impairment, Cerebral Palsy, Special Health Problems,Congenital defects; Slow Learners and Under Achievers; Intellectual Disability; Learningdisabilities and ADHD; Autism Spectrum Disorders; Multiple disabilities ; Emotional andBehavioural Problems; Gifted and Creative; Socially Disadvantaged, Economically Deprived,Religious and Linguistic Minorities, Inhabitants of Geographically Difficult Areasfor skill development and employability.

Unit III Preparing Schools for Inclusion-General Considerations and Provisions

Concept of Inclusive School, Competencies and Characteristics of inclusive TeacherPhysical Consideration, Socio-Emotional Considerations, Curricular ConsiderationsProvision of Assistive devices, equipment's and technological support. Special provisions inEvaluationfor development of employability in education sector..

Unit IV Inclusive Practices in Classroom

Making learning more meaningful: Responding to special needs by developing strategies fordifferentiating content, curriculum adaptation and adjustment, lesion planning and TLM.Pedagogical strategies to respond to needs of individual students: Cooperative learningstrategies in the classroom, peer tutoring, buddy system, reflective teaching, multisensoryteaching. Use of ICT suitable for different disabilitiesfor development of skills and employability.

Practicum

- Collection of data regarding children with special needs.
- Visit to Inclusive Schools and to observe classroom transaction of any one of such school and make a report of the same.
- Identifying one/two pupils with special needs in the primary schools and preparing a profile of these pupils.
- Preparation of teaching aids, toys, charts, flash cards for children having any one type ofdisabilityfor development of skills and knowledge. (Visit to Resource Room).
- Preparation of Lesson Plan, instruction material for teaching students with disability ininclusive school.
- Developing list of teaching activities of CWSN in the school.
- Visits to different institutions dealing with different disabilities and Observation of theirClassroom.
- In addition, school and community based activities may be organized.

Course Outcomes:

After the completion of the course, Students will be able to

CO1:Identity specific identities that exist beyond the superficial .Examples of this would be cultural background, socio-economic status, country of origin for development of skills.

CO2:Discuss possible impacts of a person self-defined identity on his/her learning or on his/her ability to teach diverse students for development of skills.

CO3:Recognize examples of unconscious bias, both in themselves and in others for development of skills.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	2	2	1	2	1	1	3
CO2	2	1	2	2	1	2	3	2
CO3	2	2	1	1	2	1	2	3

Co Curriculum Enrichment Mapping (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	2
CO2	3	2	1
CO3	3	2	1

References:

- Fimian, M.J., Fafard, M., and Howell, K.W.: *A Teacher's guide to Human Resources in Special Education: Para Professionals, Volunteers, and peer tutors.* Boston: Allyn and Bacon, Inc.
- Furth, H. (1964). *Thinking without Language.* New York: Free Press.
- Hallahan, D.P. and Kauffman, J.K. (1988). *Exceptional Children: Introduction tospecial Education.* N.J.: Englewood Cliffs.
- Jangira, N.K. (1986). *Special Education Scenario in Britain and India*. Gurgaon: TheAcademic Press.
- Jangira, N.K. (2013). NCERT: The Mother of Inclusive Education, Regional Institute of Education NCERT, Ajmer. (Also available on Google search Jangira specialeducation).
- Julba, A. (2014) Teachers creating Inclusive classrooms: Issues and challenges – Aresearch study
- Kapoor, S. (2015). Index of Inclusive School Quality, Brotherhood, Delhi.
- Kothari, R.G. and Mistry, H.S. (2011). *Problems of students and Teachers of thespecial schools – A study of Gujarat state*. Germany: VDM Publication.
- Maitra, K. & Saxena, V. (ed)(2008) *Inclusion: Issues and Perspectives,* Kanishka.
- Meadow, K.P. (1980*). Deafruss and child development.* Berkley, C.A.: University ofCalifornia Press.
- Messily,K. (2012). Confronting Marginalisation in Education: A Framework forPromoting inclusion, Routledge, London.
- Mithu, A. and Michael, B. (2005). *Inclusive Education: From rhetoric to Reality,* NewDelhi: Viva Books Pvt. Ltd.
- NCERT (2006) Position Paper: National Focus Group on Education of Children withSpecial Needs, NCERT, New Delhi.

Website Sources:

- https://www.mgkvp.ac.in/Uploads/Lectures/15/696.pdf
- http://egyankosh.ac.in/handle/123456789/46059

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 35
Internal: 15
Total: 50

BSCBED622: PEDAGOGY OF PHYSICAL SCIENCE-II

Course Objective:

The objective of the course is to enable the student- teachers to:

- Develop a broad understanding of the principles and procedures used in modern physical science education.
- Develop their essential skill for practicing modern physical science education.
- Develop their skills necessary for preparing international accessories.
- Prepare acceptance lesson models which lay down this procedure to the acceptance for preparing designs for lesson.
- Manage introduction activity in such a way that the vast majority of the learners attain most of the objectives and skills.

Course Content:

UnitI Curriculum and Instructional Material Development

Meaning, definition and principles of curriculum construction and its types, Curriculum organization using procedure like concentric, topical, process and integrated approaches, adaptation of the curriculum according to the local needs and the availability of local resources, Development of knowledge and skills aboutphysical science curriculum at different stages of school education e.g. primary, upper primary, secondary and senior secondary, Current trends in science curriculum, Preparation, selection and use of teaching aids, Curriculum accessories and support material - text books, journals, hand books, student's workbook, display slide, laboratory materials.

UnitII Content Analysis and Lesson Planning

Content analysis, pedagogical analysis of content (Taking an example of any one topic of physical science)for developement of employability in various sectors. Following points should be followed for pedagogical analysis – Identification of minor and major concepts, listing behavioral outcomes, Listing activity and experiments, listing evaluation procedure, Developing unit plans and lesson plans.

UnitIII Evaluation in Physical Science Teaching

Evaluation: meaning and needs, formative and summative evaluation, Process of development of tests for measuring specific outcomes - cognitive outcomes, affective outcomes and psychomotor outcomes, Diagnostic testing and remedial teaching, Preparation of achievement test, development of improvised apparatus.

Course Outcomes:

After completing this course students will be able to:

CO1: Understand the nature and characteristics of language of mathematics and its correlation with science and other subjectsfor skill development.
CO2: State the need and importance of evaluation.
CO3: State the aims and objectives of teaching mathematics.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	3	1	2	1	3	1	1
CO2	3	2	3	3	2	2	2	1
CO3	2	1	2	2	2	3	2	2

CO-Curriculum Enrichment Mapping

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability.	Entrepreneurship Development
CO1	3	2	2
CO2	3	1	2
CO3	3	1	1
CO4	3	1	2

References:

1. Kulshrestha, S.P. : Teaching of Physical Science, R.Lal Book Depot, Meerut
2. Sood, J.K. : Teaching of Physical Science, Agarwal Publication, Agra
3. Pandey, Shashi Kiran : Science teaching, Vani Prakashan, New Delhi
4. Rawat, D.C. : Teaching of Science, Vinod Pustak, Agra
5. Das, R.C. : Science teaching in schools, Steerling Publication, New Delhi
6. Bennett, Jeffrey : on teaching Science (print/e-book) Big Kid Science Publication
7. Singh, R. : Teaching methods in schools, Commonwealth Publication, Delhi.
8. Norman Herr : The source book for teaching Science (e-book/print) Wiley Publication
9. Pathak, R.P. : Teaching skills, Pearson Publication, New Delhi
10. Yadav, M.S. : Objective Science, Anmol Publication, New Delhi
11. Siddiqui, N.N. & Siddiqui, M.N. : Teaching of Science, Doaba House, New Delhi
12. Chauhan S.S. : Innovation in teaching, Vikas Publication, New Delhi

Website Sources:

- http://egyankosh.ac.in/bitstream/123456789/46799/1/BES-143B2-E.pdf
- https://www.learningclassesonline.com/2019/09/pedagogy-of-mathematics-in-hindi.html
- https://www.youtube.com/watch?v=d4oi-Q28wbs

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 35
Internal: 15
Total: 50

BSCBED623: PEDAGOGY OF MATHEMATICS-II

Course Objective:

The objective of the course is to enable the student- teachers for development of employability and entrepreneurship skills to:

- Understand and appreciate the uses and significance of mathematics in daily life.
- Learn successfully various approaches to mathematics and to use them judiciously.
- Know the methods of planning instruction for the classroom.
- Prepare curricular activities and organize the library in it as per the needs.
- Appreciate and organize activities to develop aesthetics of mathematics.
- Obtain feedback both about teaching as well as student's learning.

Course Contents:

Unit I

Using mathematics as a game for recreation, organizing Quiz programmes, for skill developmentin answering puzzles, magic squares, word search etc., developing a math's laboratory, Learning about the short cuts mentioned in Vedic mathematics.

Unit II

Principles and rationale of curriculum and entrepreneurship development, organizing the syllabi both logically and psychologically according to the age groups of children, Planning activities and methods of developing the substitute/ alternative material to the prescribed syllabus for completing it in due course of time, Organization of mathematics laboratory, Text book of mathematics- qualities of a good text book of mathematics, Using mathematics as a game for recreation; organizing quiz programmers, for skill-development in answering puzzles riddles, magic squares, word search etc, Learning about the short cuts mentioned in Vedic mathematics, Development of maths laboratory

Unit III

Meaning and needs of evaluation, Process of obtaining feedback and evaluation in mathematics in terms of cognitive affective and psychomotor behavioral development Comprehensive and continuous evaluation (C.C.E.) in mathematics, Development of test item (short answer and objective type), Diagnostic testing and remedial teaching Preparation of an achievement test for development of knowledge and skills.

Course Outcomes:

After completing this course students will be able to :

CO1: Develop skills of making teaching learning process experiential and joyful and make it according to local and national needs.

CO2: Understand the nature and characteristics of language of mathematics and its correlation with science and other subjectsfor development of skills.

CO3: State the need and importance of evaluation.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	3	2	2	2
CO2	2	2	3	2	2	2	3	2
CO3	2	3	2	3	1	1	3	1

CO-Curriculum Enrichment Mapping

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	3	1	1
CO3	3	2	1
CO4	3	2	2

References:

1. Maheshwari, B.K.: Teaching of Mathematics.
2. Shukla, S.C.: Teaching of Mathematics.
3. Kulshrestha, A. K.,Teaching of Mathematics.

Website Sources:

- https://www.youtube.com/watch?v=3xWDOUIlLWs
- https://hi.wikipedia.org/wiki
- www.vkmaheshwari.com
- www.pintrest.com>pin

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 35
Internal: 15
Total: 50

BSCBED624:PEDAGOGY OF BIOLOGICAL SCIENCE-II

Course Objectives:

The objective of the course is to enable the student- teachers to:

- Develop broad understanding of principles, skills and knowledge used in biology science.
- Develop their essential skills for practicing biological science.
- Know various approaches and methods of teaching life science.
- Lesson planning of biological science properly.
- Prepare tools for evaluation in biological sciences.

Course Content:

UnitI

Curriculum and resource utilization: Principles for designing a Biology curriculum.Approaches to curriculum organization using procedures like concentric, topical, process and integrated approachesfor skill development.Adapting the curriculum to local needs and requirements and the availability of local resource.Practical work in Biology; record writing for Biology projects.

Unit II

Curricular accessories and support material – Textbooks, Journals, Handbooks, student'swork books, display slides, laboratory materials, audio-video support material, etc. – theircritical evaluation from the point of view of teaching biology.

UnitIII

Evaluating outcomes of biology teaching: Merits and limitations of different item formats forassessing learning outcomes of biology teachingfor development of knowledge and skills.Writing items in different formats forevaluating learning outcomes at various levels of cognitive, affective and psychomotordomain.Try-out, item analysis and selection of items suitable for formative and summativeevaluation.Diagnostic testing and remedial teaching; developing formative evaluation instruments asaids to learning.

Course Outcomes:

After completing this course students will be able to:

CO1: Develop an understanding of the nature of biologyfor skill development.

CO2: Understand the role and importance of biology.

CO3: Identify the place of Biology in curriculumfor development of knowledge and skills.

Mapping Course Outcomes leading to the achievement of Programme Outcomes:
PO-CO Mapping (Please write 3, 2, 1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	1	1	3	1	3	3
CO2	3	2	2	2	2	1	2	3
CO3	1	2	1	2	1	2	2	2

Co Curriculum Enrichment Mapping (Please 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	1	1
CO3	3	2	2

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.SC.-B.Ed. Integrated Programme
SEMESTER- VI

External: 00
Internal: 100
Total: 100

BSCBED655: PRACTICUM: SCHOOL ATTACHMENT PROGRAMME-II

Course Objectives:

The purpose of this course is to expose students to:

- Developing social and personal skills.
- Developing observation and perception skills.
- Adding relevance and meaning to learning.
- Providing first-hand real-world experiences.
- Enhancing motivation and interest in the subjectfor skill development.

Course Content

During this phase student teachers are expected to begin developing their ownunderstanding about facilities available in school, learners and their learning context,curriculum transactions in school. Student teachers gain understanding being into actualschool environment by observation, gathering information and interaction with students,teachers and school Head.

The following tasks centered on school, learner contexts and teacher context aresuggested to be carried out by student teachers in this phase.

- Analyze how the curriculum proposed at the national /state levels are translated into class room practices by observing teacher's classes of any one subject
- Identity the resources and facilities used by the teacher for teaching a lesson and interact with teacher to identify the resource mobilization.
- Study of the availability of facilities and resources catering to curriculum transaction at upper primary and secondary levels - labs, library, activity rooms, learning resources, art and craft resources and resources for physical education and yoga.
- Study of the facilities and scope for inclusiveness in school environment.
- Observation of classes to understand the learning processes; Study the learners coming from diverse back grounds and their interaction in classrooms - social context of learners; Individual differences; learning facilities for Inclusive children.
- Observation of learners in various contexts (participation in school activities, play ground, lunch time, participatory role in school functioning, maintenance of class room and school surroundings, responsibilities taken in various club activities etc.).
- Understand the dynamics of classroom processes and multiple roles of teacher & learners.

- Understand the Classroom management strategies employed by the teacher.
- Interact with teachers to understand how unit and lesson planning are done in their subjects
- Understand school policies and practices to address student learning difficultiesremediation, extra study hours etc. - at macro level- across subjects and at micro level within the class room.
- Analyze test- question papers in subjects to understand what is assessed; types of questions/items used; and with reference to the objectives of the unit/lesson
- Reflect on the processes employed in CCE and the observed outcomesfor skill development.

Course Outcomes:

After completing the course students will be able to:

1. Develop a comprehensive and critical understanding on diversities, disabilities, marginalization and inclusive education.
2. Understand obstacles to learning due to discriminatory practices with respect to curriculum, teaching approaches, school organization, and various social and cultural factors.
3. Implicit and explicit structures in our schools that act as a hindrance in including all students.
4. Deliver pedagogies, curricula and assessments suitable to various inequalities, diversities and disabilities in Indian classroom so as to satisfy local needs.
5. Develop an understanding of Technicality of Teaching roles.
6. Curriculum Analysis helped in planning for classes.
7. Involveand interact with the school activities and were accountable for the same.
8. Understand the psycho-social needs of children.

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 70
Internal: 30
Total: 100

BSCBED631: ORGANIC CHEMISTRY – II

Course Objectives:

The objectives of this course to develop skills and knowledge:

- To understand the methods for preparation of alcohols.
- To understand the different classes of alcohols.
- To understand the structure of carboxylic acid and their derivatives.
- To understand the reactivity of different carboxylic acid derivatives.
- To understand the chemical reactions of phenols.
- To understand how to name different aldehydes and ketones.
- To understand the reactivity of different carbonyl compounds towards nucleophillicreaction.
- To understand how to write the products of addition reaction to carbonyl compounds.
- To understand to differentiate between primary, secondary and tertiary amines.

Course Content:

Unit I Alcohols and Phenols

Monohydric alcohols: Nomenclature, methods of formation (reduction of aldehydes, ketones,carboxylic acids and esters). Hydrogen bonding, Acidic nature. Reactions of alcohols(oxidation, esterification, dehydration).Dihydric alcohols: Nomenclature, methods of formation (from alkenes and alkyl dihalides),chemical reactions of vicinal glycols-oxidative cleavage [Pb(OAc)4 and HIO4] and Pinacolpinacolonerearrangement.Trihydric alcohols: Nomenclature and methods of formation(from alkenes and alkenals),chemical reactions of glycerol (with nitric acid, oxalic acid and HI).Phenols: Nomenclature, structure and bonding, Preparation of phenol. Physical properties and acidic character of phenol.Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxideion. Reactions of phenols: Electrophilic aromatic substitution, acylation and carboxylation.Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis and Reimer-Tiemann reaction for development of employability and entrepreneurship..

Unit II Carbonyl Compounds Aldehydes and Ketones

Nomenclature and structure of carbonyl group. Synthesis of aldehydes and ketones withparticular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydesand ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acidsfor development of skills.Physical properties. Mechanism of nucleophilic

addition to carbonyl group with particularemphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Use of acetals asprotecting group. Baeyer-Villiger oxidation of ketones, Cannizzaro reaction. MPV,Clemmensen, Wolff-Kishner, LiAlH4 and NaBH4 reductions. Halogenation of enolizableketones. An introduction to s, b unsaturated aldehydes and ketones.

Unit III Carboxylic Acids and their Derivatives

Nomenclature, structure and bonding. Preparation of carboxylic acids – by oxidation, usingGrignard reagents and hydrolysis of nitriles. Physical properties, acidity of carboxylic acids,effect of substituents on acid strength. Reactions of carboxylic acids: HVZ reaction, synthesisof acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism ofdecarboxylation. Methods of formation and chemical reactions hydroxy acids – malic,tartaric and citric acids.Unsaturated monocarboxylic acids: Methods of formation and chemical reactionsDicarboxylic acids: Methods of formation and effect of heat and dehydrating agentsfor development of skills and employability.Carboxylic acid derivatives: Structure and nomenclature of acid chlorides, esters, amides andacid anhydrides. Preparation of carboxylic acid derivatives, chemical reactions. Mechanismof esterification and hydrolysis (acid, base conditions).

Unit IV Organic Compounds of Nitrogen

Nitro Compounds: Introduction, Preparation of nitroalkanes and nitroarenes. Chemicalreactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and theirreductions in acidic, neutral and alkaline media. Picric acid.

Aliphatic and Aromatic amines: Structure and nomenclature of amines, Preparation ofalkyl and aryl amines (reduction of nitro compounds, nitrites), reductive amination ofaldehydic and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamidereaction. Reactivity, physical properties, stereochemistry of amines. Separation of a mixtureof primary, secondary and tertiary amines (Hinsberg's method). Structural features effectingbasicity of amines. Reactions of amines,electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid.Synthetic transformations of aryl diazonium salts.

Course Outcomes:

After ompleting the course, students will be ble to:

CO1: Able to recognize structures of acid halides, esters, amides, acid anhydrides.

CO2: Able to convert given name of alcohol to structure.

CO3: Able to write the order of reactivity of different carboxylic acid derivatves.

CO4: Able to describe different classes of alcohols.

Mapping Course Outcomes leading to the achievement of Programme Outcomes
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	2	1	2	1
CO2	2	2	2	3	1	1	1	3
CO3	2	1	3	3	1	1	2	3

Co Curriculum Enrichment Mapping (Please 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	3	1	2
CO3	3	2	2

References:

1. Advanced organic chemistry ArunBahl and B.S. Bhal
2. Organic Chemistry: Reagents and Reactions Agrawal, Goel Publishing House 53rd edition 2015
3. Organic Chemistry John Macmumy 9th Edition 2016.
4. Organic Chemistry J.Clayden, N. Greeves and S.Warren 2nd Edition 2012 Oxford University Press.

Website Sources:

- https://www.gopracticals.com/basic-engineering/
- https://edu.rsc.org/resources/practical
- https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 25
Internal: 25
Total: 50

BSCBED651: PRACTICAL(CHEMISTRY)

Course Objectives:

The objectives of this course to develop skills and knowledge:

- To understand the methods for preparation of alcohols.
- To understand the structure of carboxylic acid and their derivatives.
- To understand the reactivity of different carboxylic acid derivatives.
- To understand the chemical reactions of phenols.
- To understand how to name different aldehydes and ketones.
- To understand how to write the products of addition reaction to carbonyl compounds.
- To understand to differentiate between primary, secondary and tertiary amines.

COURSE CONTENT:

A. Qualitative organic analysis

1. Separation of organic mixtures containing two solid components using water,NaHCO3, NaOH

2. Analysis of an organic compound: Detection of extra elements (N,S and X) andfunctional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, alcohols,amines, amides, nitro and anilides) in simple organic compounds. Identification oforganic compound based on functional group analysis, determination of physicalconstant (mp / bp).

B. Chromatographic Techniques

(i) Thin Layer Chromatography

a) Determination of Rf values and identification of organic compounds:
b) Identification of plant pigments by thin layer chromatography
c) Preparation and separation of 2,4-dinitrophenylhydrazones of acetone / 2-butanone using toluene : light petroleum (2:3 ratio)
d) Separation of mixture of dyes

(ii) Paper Chromatography

Determination of Rf values and identification of organic compounds:

a) Separation of mixture of amino acids
b) Separation of mixture of D-galactose and D-fructose using n-butanol: acetic acid: water 4:5:1) ; Spray reagent: anilinehydrogenphthalate

(iii) Column Chromatography

Separation and identification of ortho and para nitro anilines

Course Outcomes:

After ompleting the course, students will be ble to:

CO1: Able to recognize structures of acid halides, esters, amides, acid anhydrides.

CO2: Able to convert given name of alcohol to structure.

CO3: Able to write the order of reactivity of different carboxylic acid derivatves.

CO4: Able to describe different classes of alcohols.

References:

- A Text Book of Qualitative Organic Analysis, A I Vogel
- A Text Book of Quantitative Organic Analysis, A I Vogel
- Systematic experiments in Chemistry Arun Sethi, New Age International(P) Ltd.

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 70
Internal: 30
Total: 100

BSCBED632: CLASSICAL & QUANTUM MECHANICS

Course Objective:

The objectives of this course are to apprise the studentsknowledge and skills about fundamental concepts in the dynamics of system of particles, motion of rigid body, Lagrangian and Hamiltonian formulation and to give them exposure basic postulates and formulations of quantum Mechanics.

Course Content:

Unit I

Constraints- sclerenomic and rheonomic constraints, holonomic and non holonomicconstraints, Generalized co-ordinates and velocities, Principle of virtual work, D'Alembert'sprinciple, Euler- Lagrange equations, Cyclic co-ordinates, Conservation laws and symmetryproperties, applications of Lagrangian formulation (simple pendulum). Canonical momenta &Hamiltonian of a system. Hamilton's equations of motion. Hamiltonian for a harmonicoscillatorfor development of skills.

Unit II

Inadequacies of Classical Physics– black body radiation andphotoelectric effect, Planck's hypothesis of black body radiation, Einstein'sexplanation of photoelectric effect with derivation, Wave-particle duality, de Broglie'shypothesis of matter waves, concept of group velocity and phase velocity and theirrelationship, Davisson and Germer experiment. Uncertainty Principle.

Unit III

Wave function, interpretation of wave function, postulates of quantum mechanics, probabilitydensity, Eigen functions and eigen values, expectation values, Normalization of wavefunctions, development of time dependent and time independent Schrodinger wave equationfor development of skills and employability.

Unit IV

Operator method of deriving Schrodinger equation. Applications of Schrodinger waveequation– one dimensional infinite potential well, finite potential well, phenomenon oftunneling, one dimensional harmonic oscillator, hydrogen atom (only qualitative discussion) for development of skills and entrepreneurship.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand constraints, necessity of Lagrangian and Hamiltonian formulationsfor development of skills and entrepreneurship.

CO2: Describe Wave-particle duality, deBroglie's hypothesis to develop skill and employability.

CO3: Explain Importance of quantum mechanics compared to classical mechanicsto develop skills and entrepreneurship.

CO4: Apply various tools to calculate eigen values, eigen functionsfor the development of skills and entrepreneurship.

Mapping Course Outcomes leading to the achievement of Programme Outcomes
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	2	1	2	1	2
CO2	1	2	2	2	2	2	2	2
CO3	2	1	3	3	2	1	1	1
CO4	3	2	3	3	3	3	3	2

Co Curriculum Enrichment Mapping (Please 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	2
CO2	3	1	1
CO3	3	1	1

References:

1. Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition edition.
2. H.Goldstein, C.P. Poole, J.L. Safko, Classical Mechanics 3rd Edn., Pearson Education, 2002.
3. L. D. Landau and E. M. Lifshitz, Mechanics, Pergamon, 1976.
4. P.S. Joag, N.C. Rana, Classical Mechanics 1st Edn., McGraw Hall.
5. R. D. Gregory, Classical Mechanics, Cambridge University Press, 2015.
6. L. I. Schiff, Quantum Mechanics, 3rd Edn., Tata McGraw Hill, 2010.
7. R. Shankar, Principles of Quantum Mechanics 2nd edition, Springer, 2014.
8. David J Grifith, Introduction to Quantum Mechanics, Addison Wesley; 2 edition, 2004.
9. P. M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, 2nd edition, McGraw Hill, 2010.
10. R. Eisberg and R. Resnick, Quantum Mechanics, 2nd edition, Wiley, 2002.
11. G. Aruldhas, Quantum Mechanics, 2nd edition, PHI Learning of India, 2002.
12. Reed, Quantum Mechanics, Jones and Bartlett Learning, 2008.

Website Sources:

- https://ocw.mit.edu
- https://cnx.org/
- https://sites.astro.caltech.edu/
- https://www.damtp.cam.ac.uk/
- http://www.physics.usu.edu/
- https://ocw.mit.edu
- http://physics.weber.edu
- http://wcchew.ece.illinois.edu
- https://chem.libretexts.org
- https://ww2.odu.edu
- http://www.pas.rochester.edu
- https://en.wikipedia.org/wiki
- http://www-personal.umich.edu

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 25
Internal: 25
Total: 50

BSCBED652: PRACTICAL (PHYSICS)

Course Objective:

The objectives of this course are to apprise the studentsknowledge and skills about fundamental concepts in the dynamics of system of particles, motion of rigid body, Lagrangian and Hamiltonian formulation and to give them exposure basic postulates and formulations of quantum Mechanics.

List of Experiments:

1. To verify superposition theorem and determine the current flowing through the load resistance.
2. To verify Thevenin theorem and determine the current flowing through the load resistance.
3. To verify Norton theorem and determine the current flowing through the load resistance.
4. To Plot the V-I characteristics of P-N junction diode.
5. To plot the input and output characteristics of transistor in Common Emitter Configuration.
6. To plot the input and output characteristics of transistor in Common Base Configuration.
7. To study a push Pull amplifier using transistor.
8. To verify the condition of oscillation in Phase shift oscillator.
9. To measure the self-inductance of a given coil by Anderson's bridge method.
10. To study the differentiator circuit and obtain differentiated pulse from it at different frequencies

Course Outcomes:

Students completing this course will be able to:

CO1: Understand constraints, necessity of Lagrangian and Hamiltonian formulationsfor development of skills and entrepreneurship.

CO2: Describe Wave-particle duality, de Broglie's hypothesisto developskills and entrepreneurship.

CO3: Explain Importance of quantum mechanics compared to classical mechanicsto developskills and employability.

CO4: Apply various tools to calculate eigen values, eigen functions development of skills and entrepreneurship.

References:

1. Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition edition.
2. H.Goldstein, C.P. Poole, J.L. Safko, Classical Mechanics 3rd Edn., Pearson Education, 2002.
3. L. D. Landau and E. M. Lifshitz, Mechanics, Pergamon, 1976.
4. P.S. Joag, N.C. Rana, Classical Mechanics 1st Edn., McGraw Hall.
5. R. D. Gregory, Classical Mechanics, Cambridge University Press, 2015.
6. L. I. Schiff, Quantum Mechanics, 3rd Edn., Tata McGraw Hill, 2010.
7. R. Shankar, Principles of Quantum Mechanics 2nd edition, Springer, 2014.
8. David J Grifith, Introduction to Quantum Mechanics, Addison Wesley; 2 edition, 2004.
9. P. M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, 2nd edition, McGraw Hill, 2010.
10. R. Eisberg and R. Resnick, Quantum Mechanics, 2nd edition, Wiley, 2002.
11. G. Aruldhas, Quantum Mechanics, 2nd edition, PHI Learning of India, 2002.
12. Reed, Quantum Mechanics, Jones and Bartlett Learning, 2008.

Website Sources:

- https://ocw.mit.edu
- https://cnx.org/
- https://sites.astro.caltech.edu/
- https://www.damtp.cam.ac.uk/
- http://www.physics.usu.edu/
- https://ocw.mit.edu
- http://physics.weber.edu
- http://wcchew.ece.illinois.edu
- https://chem.libretexts.org
- https://ww2.odu.edu
- http://www.pas.rochester.edu
- https://en.wikipedia.org/wiki
- http://www-personal.umich.edu

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 70
Internal: 30
Total: 100

BSCBED633: GROUPS AND RINGS

Course Objectives:

The main aims of this course are to introduce the concepts and to develop working knowledgeand skills on Groups, Normal Subgroups, Auto morphism groups, Finite groups and Rings.

Course Content:

Unit I

Groups, Examples, Properties and types, Sub-groups. Cyclic groups and properties, Cosets,Lagrange's theorem and its Consequences, Dihedral groups, Normal subgroups, Quotientgroupsfor development of skills and employability.

Unit II

Homomorphism and Isomorphism of groups, Kernel of a Homomorphism, Fundamentaltheorem of Homomorphism, Cauchy's theorem for abelian groups, Permutation group,Alternating Group, Cayley's Theorem.

Unit III

Rings, Integral Domains, Division Rings, Fields, Properties, Field of quotients. Ideals,Quotient rings Maximal, Prime and Principal ideals, Principal ideal ring, Divisibility in an Integral domain for development of skills and employability.

Unit IV

Homomorphism of a ring, Kernel, Isomorphism, Fundamental theorem of Homomorphism,Polynomial rings, Divisibility, Irreducible polynomials, Division Algorithm, GreatestCommon Divisor, Euclidean Algorithm for skill development.

Course Outcomes:

This course will enable the students to:

CO1: Identify the concept of Normal groups and Quotients groups.
CO2: Analyze Permutation groups and counting principle.
CO3: Explain Sylow's theorem and its applications.
CO4: Provide information on ideals and Quotient rings, Field of Quotient of an integral domain.

Mapping Course Outcomes leading to the achievement of Programme Outcomes
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	1	3	2	1	2	3
CO2	1	2	1	1	1	1	1	1
CO3	1	2	2	2	2	2	1	1
CO4	2	3	2	2	1	2	2	3

Co Curriculum Enrichment Mapping (Please 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	1	1
CO3	3	2	2

References:

1. A Brief Survey of Modern Algebra by Birkhoff and Maclane, IBH.
2. A First Course in Abstract Algebra by Fraleigh, Addison-Wesley.
3. Algebra by Michael Artin, Prentice Hall of India Pvt. Ltd.
4. Basic Abstract Algebra, 2nd Edition by P.B.Bhattacharya, S K Jain and S R Nagpaul,Cambridge University Press.
5. Contemporary Abstract Algebra by Joseph A. Gallian, Narosa Publishing House.
6. Higher Engineering Mathematics by Kreyszig, Wiley.
7. Modern Algebra – An Introduction by Durban, 5th Edition, Wiley.
8. Modern Algebra by Vasishtha, Krishna Prakashan Media Pvt. Ltd.
9. Topics in Algebra by Herstein, Wiley.

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 70
Internal: 30
Total: 100

BSCBED634: ANIMAL PHYSIOLOGY, ENDOCRINOLOGY AND IMMUNOLOGY

Course Objective:

Physiology is the study of life, specifically, how cells, tissues and organ function. It is a core and fundamental scientific discipline that underpins the health and well-being of living organisms. Besides satisfying a natural curiosity about how our body systems function, it gives us knowledge about the functions of all the parts and systems of the body. The immune system is incredibly complex. This course is hence designed to enable understanding the molecular and cellular basis of the developmentof knowledge and skills and function of the immune system and identification of its biological, clinical and therapeutic implications.

Course Content:

Unit I Digestion, Circulation and Respiration

a) **Digestion**–Physiology of digestion, role of enzymes and GI hormones. Absorption of carbohydrates, proteins, lipids, vitamins and minerals
b) **Circulation**: Composition of blood and physiology of blood clotting; Lymphatic system; origin, conduction and regulation of heart beat, heart beat and pulse, cardiac cycle, blood pressure.
c) **Respiration**– Mechanism of breathing (external respiration) in man; structure and function of haemoglobin; Transport of gases - oxygen transport, oxygen equilibrium curve, Bohr effect; Transport of carbon dioxide, chloride shift; Control and regulation of respirationfor development of skills.

Unit II Excretion, Nerve and Muscle Physiology

a) **Excretion**: Nitrogenous waste products – Ammonotelism, ureotelism, uricotelism; Ornithine cycle; outline structure of human kidney and nephron, physiology of urine formation, counter-current mechanism; micturation; dialysis
b) **Homeostasis**– thermoregulation in animals – Poikilotherms, heterotherms and homeotherms, adaptive changes in animals
c) **Nervous Co-ordination**– Structure and types of neuron and synapses; Physiology of transmission of impulse across axons and synapses, neuroinhibiters and neurotransmitters (4)
d) **Muscle contraction**–Ultrastructure of striated muscle, Contractile and regulatory proteins, neuro-muscular junction, mechanism of skeletal muscle contraction

Unit III **Endocrinology**for skill development.

a) General organization of mammalian endocrine system
b) Pituitary, thyroid, parathyroid, adrenal and gonads – Structure and functions of their secretions, abnormalities, A brief account on hormonal control of human pregnancy
c) Hormones: properties, feed-back mechanism, classification, mode of action of hormones (steroid and peptides)
d) **Reproductive cycles**– Estrous cycle in cow and menstrual cycle

Unit IV Immunology

Introduction to Immunology, Types of Immunity, Lymphoid organs, Cells of immune system;Overview of antigen, structure and types of antibody, antigen-antibody reaction; Immuneresponses – Humoral and cell–mediated immunities (2); Autoimmunity and hypersensitivityfor development of skills and knowledge.

AIDS - Structure of HIV, preventive measures of AIDS.

Course outcome:

After completion of the course the students will be able to:

CO1: Describe the basic mechanisms, distinctions and functional interplay of innate and adaptive immunity
CO2: Relate to errors occurring during development leading to congenital disorders and human diseases
CO3: Understand the concept of Endocrinology
CO4: Develop ideas of Immunology and its structure and types

Mapping Course Outcomes leading to the achievement of Programme Outcomes
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	3	3	3	3	2
CO2	2	2	1	2	1	3	1	1
CO3	2	2	1	1	1	1	2	2
CO4	1	2	2	1	2	1	2	2

Co Curriculum Enrichment Mapping (Please 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability.	Entrepreneurship Development
CO1	3	1	1
CO2	3	2	2
CO3	3	1	1
CO4	3	1	1

Suggested Readings:

1. Animal Physiology by A. Maria Kuttikan& N. Arumugam – (Saras Publication,Nagercoil, Tamil Nadu).
2. Regulatory mechanism in Vertebrates by Kamleshwar Pandey and J.P. Shukla - (Rastogi Publications, 2008).
3. Animal Physiology by K.A. Goyal and K.V. Sastry – (Rastogi Publications, 2008).
4. Endocrinology and Reproductive Biology by K.V. Sastry – (Rastogi Publications, 2008).
5. Animal Physiology by Arora M.P. (1989) – Himalaya Publishing House.
6. Textbook of Medical Physiology by Guyton A.C. & Hall J.E. (1996) – (W.B. Saunders& Co.).
7. General and Comparative Physiology by Hoar W.S. (1983) – (Prentice HallPublication).
8. A textbook of Animal Physiology by Hurtkat P.C. &Mathur P.N. (1976) – (S. Chand &Co.).
9. Textbook of Animal Physiology by Nagabhushanam R. &Kodarkar M.S. (1978) – (IBH).
10. General Endocrinology by Turner C.D. &Gangara J.T. (1971) – (W.B. Saunders & Co.)
11. Immunology by Dulsi Fatima

Website Sources:

- https://www.hhmi.org/biointeractive/human-embryonic-development
- https://www.khanacademy.org/science/biology/developmental-biology
- https://ocw.mit.edu/courses/biology/7-22-developmental-biology-fall-2005/index.htm
- https://embryology.med.unsw.edu.au/embryology/index.php/Main_Page

Note: Latest editions of all the suggested readings must be used.

IFTM UNIVERSITY, MORADABAD
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B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 25
Internal: 25
Total: 50

BSCBED653: PRACTICAL (ZOOLOGY)

Course Objective:

Physiology is the study of life, specifically, how cells, tissues and organ function. It is a core and fundamental scientific discipline that underpins the health and well-being of living organisms. Besides satisfying a natural curiosity about how our body systems function, it gives us knowledge about the functions of all the parts and systems of the body. The immune system is incredibly complex. This course is hence designed to enable understanding the molecular and cellular basis of the developmentof knowledge and skills and function of the immune system and identification of its biological, clinical and therapeutic implications.

COURSE CONTENT*:*

1. Preparation of blood smears.
2. Total count of RBC.
3. Total count of WBC.
4. Differential count of Leucocytes.
5. Estimation of haemoglobin.
6. Human urine analysis for a) Nitrogenous substances, b) Normal inorganic constituents, c)Abnormal constituents – (i) glucose, (ii) protein, (iii) ketone bodies.
7. To set up simple experiments to find out the rate of respiration in terrestrial/aquaticanimals like cockroach, fish or rat.
8. Study of stained slides of mammals –
   T.S. of a) Stomach b) Intestine c) Kidney d) Livere) Pituitary, f) Adrenal gland, g)Thyroid, h) Testis, i) Ovary, j) Placenta, k) Pancreas.
9. Effect of different Conc. NaCl on RBCs.

Course outcomes:

After completion of the course the students will be able to:

CO1: Describe basic and state-of-the-art experimental methods and technologiesdevelopmentof knowledge and skills.

CO2: Integrate knowledge of each subsystem to see their contribution to the functioning of higher-level systems in health and disease including basis of vaccination, autoimmunity, immunodeficiency, hypersensitivity and tolerancefor developmentof knowledge and skills.

Suggested Readings:

1. Animal Physiology by A. Maria Kuttikan& N. Arumugam – (Saras Publication,Nagercoil, Tamil Nadu).
2. Regulatory mechanism in Vertebrates by Kamleshwar Pandey and J.P. Shukla - (Rastogi Publications, 2008).
3. Animal Physiology by K.A. Goyal and K.V. Sastry – (Rastogi Publications, 2008).
4. Endocrinology and Reproductive Biology by K.V. Sastry – (Rastogi Publications, 2008).
5. Animal Physiology by Arora M.P. (1989) – Himalaya Publishing House.
6. Textbook of Medical Physiology by Guyton A.C. & Hall J.E. (1996) – (W.B. Saunders& Co.).
7. General and Comparative Physiology by Hoar W.S. (1983) – (Prentice HallPublication).
8. A textbook of Animal Physiology by Hurtkat P.C. &Mathur P.N. (1976) – (S. Chand &Co.).
9. Textbook of Animal Physiology by Nagabhushanam R. &Kodarkar M.S. (1978) – (IBH).
10. General Endocrinology by Turner C.D. &Gangara J.T. (1971) – (W.B. Saunders & Co.)
11. Immunology by Dulsi Fatima

Website Sources:

- https://www.hhmi.org/biointeractive/human-embryonic-development
- https://www.khanacademy.org/science/biology/developmental-biology
- https://ocw.mit.edu/courses/biology/7-22-developmental-biology-fall-2005/index.htm
- https://embryology.med.unsw.edu.au/embryology/index.php/Main_Page

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 70
Internal: 30
Total: 100

BSCBED635: PLANT PHYSIOLOGY AND METABOLISM

Course Objective:

This course aims to familiarize the students with various physiological processes, water absorption, transpirations, ascent of sap, photosynthesis and respiration. The main objective of this course is to develop knowledge and skillsunderstand the growth hormones and their role in plant's physiology, Nutrients elements and their role in metabolic processes.

Course Content:

Unit I

a) Importance of water to plant life, properties of water.
b) Diffusion, osmosis and imbibition – definitions, concept of water potential, osmotic potential.
c) Absorption of water: Root as an absorbing organ, mechanism and pathways of water active and passive obsorption movement from root hair to root xylem - symplast, apoplast and trans-membrane pathways.
d) Ascent of sap: Vertical pathway of water in plants, structural properties of xylem, root pressure theory, cohesion – tension hypothesis for skill development and entrepreneurship.

Unit II

a) Transpiration: Definition, types, mechanism of stomatal opening and closing (role of K+ and Abscisic acid), factors and significance of transpiration, guttation.
b) Cellular Respiration: Introduction, respiratory quotient, aerobic and anaerobic respiration, structure of mitochondrion, glycolysis, synthesis of acetyl CoA, Krebs cycle, oxidative phosphorylation, electron carrier complexes factor affecting respirationfor skill development and employability.

Unit III

a) Photosynthesis: Introduction, ultrastructure of chloroplast, photosynthetic pigments, absorption and action spectra, photochemical (light) reaction, photophosphorylation, Z-scheme, Calvin cycle, C4 pathway, CAM pathway, photorespiration, factors and significance of photosynthesis.
b) Transport of Organic Substances: Ultrastructure and functions of phloem, (sieve tube), mechanism of phloem transport, source – sink relationship, theories and factors affecting.

c) Mineral Nutrition: Major and micro-nutrients, Nitrogen Metabolism: biological nitrogen fixatra. Role of N, P, K, Ca, Mg, Fe, N and Zn in plant metabolism, Mineral deficiency symptoms.

Unit IV

a) Growth and Development of skills and knowledge of photomorphogenesis: Definitions, phases of growth and development, photomorphogenesis, physiological role and factor affecting the group of plants.

b) Plant growth Regulators: General account, discovery, chemical nature, physiological effects and applications of auxins, kinins, gibberellins, ethylene and abscisic acid.

c) Physiology of flowering: (i) Brief account of photoperiodism, short day, long day and day-neutral plants, night interruption phenomenon, florigen concept, role of phytochromes (ii) Brief account of vernalization.

Course Outcomes:

On completion of the course, students will be able to:

CO1: Understand the plants and plant cells in relation to water, the movement of sap and absorption of water in plant body.

CO2: Know micro and macronutrients and their role in plant developments.

CO3: Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C_3 and C_4 pathways.

CO4: Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.

Mapping Course Outcomes leading to the achievement of Programme Outcomes
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	2	2	2	3
CO2	3	1	2	1	2	1	1	2
CO3	3	2	1	1	1	2	3	2
CO4	2	1	1	2	3	2	3	1

Co Curriculum Enrichment Mapping (Please 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	2
CO3	3	1	2
CO4	3	1	1

References:

1. Hopkins, W.J.1995, Introduction to Plant Physiology, John Wiley and Sons, Inc., New York.
2. John, J.L., 1994, Fundamentals of Biochemistry, Sultanchand& Co., New Delhi.

3. Lehninger A.B., 1982, Principles of Biochemistry, CBS Publishers and Distributors, New Delhi.
4. Leo, P.J. and R.C.Leegood, 1999, Plant Biochemistry and Molecular Biology, John Wiley & Sons, England.
5. Salisbury, F.B. and C.W.Ross, 1992, Plant Physiology (4th Ed.) Wadsworth Publishing Co.USA.
6. Srivastava H.S. and N Shankar, 2006, Plant Physiology and Biochemistry, Rastogi Publications, Meerut,
7. Srivastava, H.S., 2005, Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications, Meerut.

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IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VI

External: 25
Internal: 25
Total: 50

BSCBED654: PRACTICAL (BOTANY)

Course Objective:

This course aims to familiarize the students with various physiological processes, water absorption, transpirations, ascent of sap, photosynthesis and respiration. The main objective of this course is to develop knowledge and skillsunderstand the growth hormones and their role in plant's physiology, Nutrients elements and their role in metabolic processes.

COURSE CONTENT:

1. Study of Osmosis (Exosmesis& Endosmosis) by PofetoOsmoscope.
2. Study of Plasmolysis in Hydrilla/ Tradescantria leaves.
3. Study of transpiration rate under different conditions by using Ganong's/ Farmer's Potometer.
4. Study of RQ different respiratory substrates (Carbohydratess, Proteins, fats) by using Gangong's respirometer.
5. Estimatra of the protein cantent in extracts of plant material by lowry's methods.
6. Study of the presence of starch in green leaf.
7. Study of the seed germination and seeding growth under the salt stree condition.
8. Measurement of growth by using arch auxamenmeter.
9. Comparison of rate of photosynthesis under different environmental conditions by using wilmat's bubblers.
10. Demonstration of necessity of light, CO2 and chlorophyll for photosynthesis.
11. Plotting the absorption spectrum of chlorophylls.
12. Quantitative estimation of chlorophylls by colorimetry.
13. Demonstration of aerobic and anaerobic respiration.
14. Study the distribution of growth in roots.
15. Observation of cyclosis in plant materials.
16. Testing the germinability of seeds using TTC.

Course Outcomes:

On completion of the course, students will be able to:
CO1: Understand the plants and plant cells in relation to water, the movement of sap and absorption of water in plant body.

CO2: Know micro and macronutrients and their role in plant developments.
CO3: Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C_3 and C_4 pathways.
CO4: Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.

References:

8. Hopkins, W.J.1995, Introduction to Plant Physiology, John Wiley and Sons, Inc., New York.
9. John, J.L., 1994, Fundamentals of Biochemistry, Sultanchand& Co., New Delhi.
10. Lehninger A.B., 1982, Principles of Biochemistry, CBS Publishers and Distributors, New Delhi.
11. Leo, P.J. and R.C.Leegood, 1999, Plant Biochemistry and Molecular Biology, John Wiley & Sons, England.
12. Salisbury, F.B. and C.W.Ross, 1992, Plant Physiology (4th Ed.) Wadsworth Publishing Co.USA.
13. Srivastava H.S. and N Shankar, 2006, Plant Physiology and Biochemistry, Rastogi Publications, Meerut,
14. Srivastava, H.S., 2005, Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications, Meerut.

Website Sources:

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- www.digitalbookindex.org
- www.pdf.com
- *en.wikipedia.org*
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- www.freebookcentre.net

Semester –VII

Course	Code	Subject	Title	Credit	Internal	External		Total
						Theory	Practical	
PEC 1	BSCBED721		Health and Physical Education	4	30	70	--	100
PEC 2	BSCBED755		**Practicum:** Internship in School Subject 1 : Physical Science	4	--	--	100	100
PEC 3	BSCBED756		**Practicum:** Internship in School Subject 2: Mathematics	4	--	--	100	100
	BSCBED757		**Practicum:** Internship in School Subject 2: Biological Science	4	--	--	100	100
Subjects - As per semester I								
Group – A								
GEC 1	BSCBED731	Chemistry	Electrochemistry and Photochemistry	3	30	70	--	100
	BSCBED751		Practical	1	25	--	25	50
Group – B								
GEC 2	BSCBED732	Physics	Nuclear and Particle Physics	3	30	70	--	100
	BSCBED752		Practical	1	25	--	25	50
	BSCBED733	Mathematics	Linear Algebra	4	30	70	--	100
Group – C								
GEC 3	BSCBED734	Zoology	Cell Biology, Genetics and Evolution	3	30	70	--	100
	BSCBED753		Practical	1	25	--	25	50
	BSCBED735	Botany	Cell Biology and Genetics	3	30	70	--	100
	BSCBED754		Practical	1	25	--	25	50
Total Marks (PCM Group)								400

Total Marks (ZBC Group)	450
Total Semester Marks (PCM Group)	***700***
Total Semester Marks (ZBC Group)	***750***

- **PEC =** Professional Education Component (PEC)
- **GEC =** General Education Component (GEC)

IFTM UNIVERSITY, MORADABAD
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SEMESTER- VII

External: 70
Internal: 30
Total: 100

BSCBED721; HEALTH AND PHYSICAL EDUCATION

Course Objective:

The purpose of this course is to expose students to:

- Introduce with the concept of wholistic health and various dimension and determinants of health.
- Acquaint them to school health programmed its importance.
- Sensitize the student towards physical fitness & its importance to develop skills of the same.
- Help them acquire the skills for assessment of physical fitness.
- Introduce them to the philosophical bases of Yoga.
- Understand the process of stress management through Yoga education.
- Acquire the knowledge of techniques of performing yogasana and develop the skill for the same.

Course Content:

Unit-I

Health Education Scenario in India

Introduction to the concept of health, significance and importance in the context of ancient

and modern Indian perspectiveIdentity of Educational Institutional Plants: Structure, Infra-Structure and Environment,Time-Space-Personnel-Material Constellation Educational Management System, EmergingHealth & Total Quality of the Educational Institutions, Status of Health Education in Indiafrom Pre-Natal Education through Higher Education, Yoga &Yog, Health & Hygiene, CleanToilets, Work & Leisure, Quality of Health – Role of Education, Administrators, Teachers,Students, Supporters,for the development of skills and employability

Unit- II

Tech-related Health Risks

Identification of the technological health hazards – Smartphone Stress, Acne caused by theCell Phones, Blackberry Stress Injuries to the Thumb, Radiation from the cell phones, CellPhone Sickness, Cell Phone & Car Accidents, Allergies & Phones, Crazy Phones, ComputersCausing Wrist Pain, Back & Neck Pain, Decreased Sperm Count from the WIFI, LaptopBurns, Laptop Headaches, Sleeping Problems from the Laptops, Decreased attention spanfrom using Face-book, The Internet Causing Anxiety, Headphone Use leading to Accidents,Hearing Loss from Headphones, Visual Impairment, Death from

Social Networking,Environmental Degradation, Aggression, Social Crimes--- Evolving Controlling &Regulatory Mechanismsfor the development of skills and employability

Unit- III

Approaches to Sound Health

Physical fitness, strength, endurance and flexibility, its components, sports skills, indigenousand self-defence activities.Games and sports – athletics (general physical fitness exercises), games (lead-up games,relays and major games) rhythmic activities, gymnastics and their impact on health.Fundamental skills of games and sports; Sports for recreation and competition; Rules andregulation of sports; sports ethics; sports awards and scholarships, sportsmenship.Yoga. Safety and security – Safety measures to be taken in Libraries, Laboratories,Classrooms, Halls, Play Fields, Water Tanks, Swimming Pools, Community Pools, RoadsHuman Development Index (HDI), Health: Vision, Goals and Objectives of Government ofIndia, Experiments on Influence of Surroundings & Thought, Science of Laughter & Smiles,Health Observation Programs, Impact of TV Serials.Role of Institutions (schools, family and sports), health services, policies and major healthand physical education-related programme, blood banks, role of mediafor the development of skills and employability

Unit- IV

First Aid – Principles and Uses

Structure and function of human body and the principles of first aid. First aid equipments.Fractures-causes and symptoms and the first aid related to them, Muscular sprains cause,symptoms and remedies, First aid related to hemorrhage, respiratory discomfort, First aidrelated to Natural and artificial carriage of sick and wounded person, Treatment ofunconsciousness, Treatment of heat stroke, General disease affecting in the local area andmeasures to prevent themfor the development of skills and employability

racticum

Surfing to know the diseases in India.Preventive & Ameliorative measures for health hazards.Playing Games.Athletics.Yoga.Reflective Dialogues on Serials, such as, Satyamev Jayate on Health of the People.Preparation of inventories on myths on exercises and different type of food.Make an inventory of energy rich food and nutritious food (locally available) indicating itshealth value.Strategies for positive thinking and motivation.Preparation of first aid kitfor the development of skills and employability

Course Outcomes:

After the completion of the course, Students will be able:

CO1: Develop understanding about health, its significanceand scenario of health education in Indiafor the development of skills and employability

CO2: Developing understanding about the health issues due to tech-aidsfor the development of skills and employability

CO3: Fmiliarize students of good health can be achievedfor the development of skills and employability

CO4:Develop understanding about the concept of first aid- its principles and usesfor the development of skills and employability

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	2	2	2	2	2	3	2
CO2	2	1	2	2	1	2	2	1
CO3	3	1	3	3	2	1	1	2
CO4	2	1	1	3	3	1	3	2

CO-Curriculum Enrichment Mapping(Please write 3,2,1wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	1	1
CO4	3	1	1

References:

- Agarwal, Satya P. (1998). The social role of the Gītā: how and why, Motilal Banarsidass, ISBN 978-81-208-1524-7, retrieved 17 June 2010.
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- Bette J., Logdson& Others, "Physical Education for Children", Lea and Febiger, Philadelphia.
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- Goel, Devraj & Goel, Chhaya (2013). Universe of Swami Vivekananda & Complete.
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- Jason Liu and Dr.Gwendalle Cooper (2009) *Scientific Analysis of the Effects of Falun Dafa*Presented at International Conference of Psychologists, February 27, 2009 by Catherine Hennessy.
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- Ministry of Health & Family Welfare, Government of India, *Annual Report to the People on Health*, December 2011.
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- NCERT (2014). Population Education, Source Material, NCERT, New Delhi.
- NCERT (2015). Yoga: A Healthy Way of Living Secondary Stage, New Delhi.
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- Roberts, S. Weinberg & Daniel Gould, "Foundation of Sports and Exercise Psychology", Human Kinetics Publication.
- Stephen, J. Williams, Paul R. Torrents, "Introduction to Health Service", Delmore Publications.
- Swami SatyanandSaraswati, "Asana Pranayama Mudra Bandh", Bihar School of Yoga, Munger.

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- http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/health_prelims_final.pdf
- Learning curves: sports in education, (2013) Azim Premji Foundation
- http://azimpremjifoundation.org/pdf/learning-curve-17.pdf
- www.FalunDafa.org
- www.http://greatist.com/health/*19-worst-tech-related-health-risks*

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VII

External: 70
Internal: 30
Total: 100

Select anyTtwo School Subjects on the basis of General Education Component (GEC)

BSCBED755: *PRACTICUM:* INTERNSHIP IN SCHOOL SUBJECT PHYSICAL SCIENCE

BSCBED756: *PRACTICUM:* INTERNSHIP IN SCHOOL SUBJECT MATHEMATICS

BSCBED757: *PRACTICUM:* INTERNSHIP IN SCHOOL SUBJECT BIOLOGICAL SCIENCE

Course Objective:

The purpose of this course is to expose students to:

- Understanding the Internship School and the community around.
- Analysis of school syllabus and textbooks.
- Observing the classroom teaching of regular teachers.
- Observation of classroom teaching of peer student-teachers.
- Preparation of case study of the internship school and the innovative activities that the school undertakes.
- Preparation of Lesson Plans and Unit Plans.
- Teaching the units of the prescribed syllabus in two subjects currently being taught in the school.
- Teaching as a substitute teacher.
- Mobilisation and development of teaching-learning resources.
- Preparation of a question papers and other assessment tools.
- Preparation of a diagnostic tests and organisation of remedial teaching.
- Undertake case study of a child.
- Undertake action research project on at least one problem area of schooling.
- Community work, community survey etc.

- Maintenance of a reflective diary or journal to record day to day happenings and reflections thereon.
- Writing a term paper on a selected themeto inculcate skill, provide employability and entreprepreneuriel skills.

Course Outcomes:

After the completion of the course, Students will be able to:

CO1: Develop a comprehensive and critical understanding on diversities, disabilities, marginalization and inclusive educationfor the development of skills and employabilityentrepreneurship.

CO2: Understand obstacles to learning due to discriminatory practices with respect to curriculum, teaching approaches, school organization, and various social and cultural factors to meet local needs and for the development of skills and employabilityentrepreneurship.

CO3: Implicit and explicit structures in our schools that act as a hindrance in including all studentsfor the development of skills and employability

CO4: Deliver pedagogies, curricula and assessments suitable to various inequalities, diversities and disabilities in Indian classroomfor the development of skills and employability

CO5: Develop an understanding of Technicality of Teaching rolesfor the development of skills and employability

CO6: Curriculum Analysis helped in planning for classesfor the development of skills and employability entrepreneurship.

CO7: Involveand interact with the school activities and were accountable for the samefor the development of skills and employabilityentrepreneurship.

CO8: Understand the psycho-social needs of childrenfor the development of skills and employability

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B.Sc.-B.Ed. Integrated Programme
SEMESTER- VII

External: 70
Internal: 30
Total: 100

BSCBED731: ELECTROCHEMISTRY AND PHOTOCHEMISTRY

Course Objectives:

The objectives of this course are:

- To understand the concepts of electrochemistry.
- To understand the working and reaction of electrochemical cells.
- To understand the Nernst equation
- To understand the photochemical reactions and their applications to develop skills of the same.

Course Content:

Unit- I

Electrochemistry – I

To study the behaviour and reactions of ions in a variety of environments through the laws that governthem. Electrical transport – conduction in metals and in electrolyte solutions, specific conductanceand equivalent conductance, measurement of equivalent conductance, variation of equivalent andspecific conductance with dilution.Migration of ions Kohlrausch law, Arrhenius theory of electrolyte dissociation and itslimitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations.Transport number, definition and determination by Hittorf method.Applications of conductivity measurements: Determination of degree of dissociation,determination of Ka of acids, determination of solubility product of a sparingly soluble saltfor the development of skills and employability

Unit- II

Electrochemistry – II

Electrode reactions, Nernst equation, derivation of cellE.M.F. and single electrode potential, standard hydrogen electrode-reference electrodes–standard electrode potential, sign conventions, electrochemical series and its significance.To draw up a scheme for discussing the equilibrium position for an ionic reaction in terms ofthe electrode potential. Electrolytic and Galvanic cells–reversible and irreversible cells,conventional representation of electrochemical cells.EMF of a cell and its measurements. Computation of cell EMF, Calculation ofthermodynamic quantities of cell reactions (DG, DH and K), Chemical cells with and withouttransportfor the development of skills and employability

Unit- III

Electrochemistry – III

Concentration cell with and without transport, liquid junction potential, application ofconcentration cells, valency of ions, solubility product and activity coefficient.Definition of pH and pKa determination of pH using hydrogen, quinhydrone and glasselectrodes, hydrogen over voltagePower storage, Lead Battery, Ni-Cd cells, Fuel Cells, Hydrogen–Oxygen cell.Thermodynamic and Kinetic basis of corrosion, methods of inhibition of corrosionfor the development of skills and employability

Unit- IV

Photochemistry

Discussing the Interaction of radiation with matter, difference between thermal andphotochemical processes. Laws of photochemistry: Grothus – Drapper law, Stark – Einsteinlaw, Jablonski diagram showing various processes occurring in the excited state, qualitativedescription of fluorescence, phosphorescence, non-radioactive processes (internal conversion,intersystem crossing), quantum yield, photosensitized reactions – energy transfer processes(simple examples), Chemiluminescencefor the development of skills and employability

Course Outcomes:

After the completion of the course, the students will be:

CO1: Able to recognize the reaction of electrochemical cells and types

CO2: Able to predict the reversible and irreversible reactionfor the development of skills and employability

CO3: Have knowledge of photochemical laws and their applicationsfor the development of skills and employability

CO4: Able to solve numerical problems related to electrochemistryfor the development of skills and employability

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	2	1	1	2	2
CO2	1	1	1	2	1	2	1	1
CO3	1	2	1	1	1	2	2	1
CO4	2	1	1	2	1	1	1	2

CO-Curriculum Enrichment Mapping (Pleasewrite 3,2,1wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

References:

1. Photochemistry Gurudeep Raj Goel Publishing House
2. Principles of Physical Chemistry Puri, Sharma, Pathania 47th EditionVishal Publishing Co.
3. Elements of Elecrochemistry by Samuel Glasstone and Lewis
4. Principles of Physical chemistry -Marron and Prutton

Website Sources:

- https://www.gopracticals.com/basic-engineering/
- https://edu.rsc.org/resources/practical
- https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
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B.Sc.-B.Ed. Integrated Programme
SEMESTER- VII

External: 25
Internal: 25
Total: 50

BSCBED751: PRACTICAL (CHEMISTRY)

Course Objectives:

The objectives of this course are:

- To determine the solubility and solubility constant.
- To know equivalent conductance of a strong electrolyte.
- To understand potentiometryto inculcate skill, provide employability ansentreprepreneuriel skills.

Course Content:

1. To determine the equivalent conductance of a strong electrolyte at several concentrations and verify Onsager's equation.
2. Conductometric titration of a strong acid Vs. strong base, strong base Vs. weak acid, strong base Vs mixture of acids (strong and weak) to determine the concentration ofacids in a given solution and in mixture.
3. To determine the concentration of the given acid solution and concentration of acids ina mixture by potentiometric titration using sodium hydroxide solution.
4. Determination of Pka value of a weak acid by potentiometry.
5. Determination of the dissociation constant of a weak acid by conductometry
6. To determine the equivalent conductance of a weak electrolyto at differentconcentrations and verify Ostwald's dilution law. Also to find out the dissociation constant of a weak electrolyte.
7. To determine the solubility and solubility constant of a weak electrolyteconductometrically.
8. To find the composition of the complex formed between iron(III) and salicylic acid byJob's method.
9. To find out the amount of copper sulphate in the given solution by titrating withstandard alkali by conductometry.
10. To determine the amount of FAS in the given solution by potentiometric titration withstandard potassium dichromate and potassium permanganate solutions.

Estimation of Silver nitrate by potentiometric titration with standard potassiumchloride solutionfor the development of skills and employability

Course Outcomes:

After the completion of the course, the students will be:

CO1: Students are able to know solubility and solubility constant of a weak electrolytefor the development of skills and employability.

CO2: Ability to know the Quantitative analysisfor the development of skills and employability.

CO3: Ability to know the dissociation constant of a weak acid byfor the development of skills and employability.

References:

1. A Text Book of Qualitative Organic Analysis, A I Vogel
2. A Text Book of Quantitative Organic Analysis, A I Vogel
3. Systematic experiments in Chemistry ArunSethi, New Age International(P) Ltd.

Website Sources:

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SEMESTER- VII

External: 70
Internal: 30
Total: 100

BSCBED732: NUCLEAR AND PARTICLE PHYSICS

Course Objective:

This course aims is to familiarize the students about content areas of nuclear properties, nuclear models and particle physics for skill development, employability and entrepreneurship.

Course Content:

Unit- I

Basicproperties of nucleus– charge, spin, radii, mass, magnetic moment. Nuclear forces and theircharacteristics. Yukawa's Theory (Qualitative), Packing fraction and binding energy, averagebinding energy and its variation with mass number, main features of binding energy versusmass number curve, nuclear stabilityfor the development of skills and employability.

Unit -II

Nuclear Models– Liquid drop model approach, semi empirical mass formula and significanceof various terms, condition of nuclear stability. Two nucleon separation energies, Fermi gasmodel (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence fornuclear shell structure, nuclear magic numbers, basic assumption of shell modelfor the development of skills and employability

Unit- III

Radioactive decay – Half life, mean life, Activity-decay constant. Radioactivedisplacement laws. Theory of a decay, α-emission, Gamow factor. Geiger-Nuttal law. Betadecay, energy kinematics for Beta decay, positron emission Beta spectra. Neutrino hypothesis,K electron capture, internal conversion, Gamma decay, pair production, successivedisintegration, units of radio activity, radioactive dating, uncontrolled and controlled chainreactions, nuclear fission and fusion. Energy liberated in nuclear fissionfor the development of skills and employability

Unit- IV

Particle Accelerators and Detectors: Cockroft– Walton voltage multiplier, LINAC, Cyclotron,Betatron.

Nuclear Detectors: GM counter, scintillation detector, bubble chamber, principle ofsemiconductor detectorfor the development of skills and employability

Course Outcomes:

Students completing this course will be able to:

CO1: Acquire basic knowledge about nuclear properties such as mass, spin, radius, mass defect, binding energy etc.

CO2: Develop the understanding of nuclear disintegration for the development of skills and employability.

CO3: Understand the various nuclear modelsfor the development of skills and employability.

CO4: Construction, working and applications of accelerators and detectors for developing skills.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	3	1	2	2	1
CO2	2	2	1	1	1	1	2	2
CO3	1	2	2	1	2	1	1	2
CO4	1	2	2	3	2	1	2	2

CO-Curriculum Enrichment Mapping(Pleasewrite 3,2,1wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1

References:

1. Kaplan, Nuclear Physics, Narosa, 2002.
2. Kenneth S. Krane, Introductory nuclear Physics, Wiley India Pvt. Ltd., 2008.
3. Bernard L. Cohen, Concepts of nuclear physics, Tata McGraw Hill, 1998.
4. Subramanyam and Brijlal, Atomic and Nuclear Physics, S. Chand & Company Ltd. 2013.
5. R.A. Dunlap, Introduction to the physics of nuclei & particles, Thomson Asia, 2004.
6. Arthur Beiser, Perspectives of Modern Physics, McGraw-Hill Inc.,US; International edition.
7. D. Griffith, Introduction to Elementary Particles, John Wiley & Sons, 2008.

Website Sources:

- https://en.wikipedia.org
- https://fys.kuleuven.be
- http://oregonstate.edu
- https://cds.cern.ch
- http://physics-database.group.shef.ac.uk
- https://www.physics.umd.edu

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VII

External: 25
Internal: 25
Total: 50

BSCBED752: PRACTICAL (PHYSICS)

Course Objectives:

This objective of this course is to familiarize the students about G M counters, FET, Hartley oscillator and spectrometer etc. by performing experimentsto inculcate skill, provide employability ansentrepreprepreneuriel skills.

Course Content:

(A minimum of TEN experiments to be selected from the following)

1. GM Counter characteristics.
2. GM Counter– Absorption coefficient.
3. Determination of Half life of Co-60.
4. Simulation experiment on radioactive decay.
5. Verification of inverse square law for beta rays.
6. Verification of inverse square law for gamma rays.
7. Rutherford model– Simulation technique.
8. Ionization potential of Xenon.
9. Measurement of Mercury spectrum wavelength.
10. Spectrometer-Quartz prism-Refractive indices of quartz for the ordinary and extraordinaryrays.
11. LCR Parallel resonance
12. LCR Series resonance.
13. FET characteristics.

Hartley oscillator.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand characteristics of GM Counterfor the development of skills and employability.

CO2: Plot characteristics of FET.

CO3: Verify inverse square lawfor the development of skills and employability.

CO4: Evaluate ionization of Xenonfor the development of skills and employability.

References:

1. Solid State Electronic Devices by B.G. Streetman.
2. Integrated Electronics by J. Millman and C.C. Halkias.
3. Electronics Devices and Circuit Theory by R.L. Boylested and L. Nashelysky.
4. Electronic Devices and Circuits by Balbir Kumar and S. B. Jain.

Website Sources

- https://circuitglobe.com
- https://ecee.colorado.edu
- https://ecee.colorado.edu
- https://en.wikipedia.org
- http://www.sasurieengg.com

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VII

External: 70
Internal: 30
Total: 100

BSCBED733: LINEAR ALGEBRA

Course Objectives:

The main aims of this course are to clear the basic concept of linear algebra, it play an important role to study and analyze the mathematical problems. The student learns about vector Spaces, inner product spaces, linear transformation on these spaces and their canonical forms and types of linear transformationsto inculcate skill, provide employability andentrepreneuriel skills.

Course Content:

Unit- I

Vector spaces, Subspaces, Linear Combinations, Linear span, Linear dependence and Linearindependence of vectors, Basis and Dimension, Finite dimensional vector space – someproperties. Quotient spaces, Homomorphisms and Isomorphisms of vector spaces, Directsumsfor the development of skills and employability.

Unit -II

Inner product spaces, Euclidean vector spaces, Distance, Length, Properties, Cauchy-Schwarz inequality, Orthogonal and orthonormal vectors, Gram Schmidt OrthogonalisationProcess, Orthogonal complementfor the development of skills and employability.

Unit -III

Matrices of Linear maps, Change of basis and the effect of associated matrices, Kernel andImage of a linear transformation, Rank and Nullity theoremsfor the development of skills and employability.

Unit- IV

Singular and non-singular linear transformations, Minimal Polynomialfor the development of skills and employability.

Course Outcomes:

This course will enable the students to:

CO1: Understand the concepts of Liner independence, bases and Dual spaces for the development of skills and employability.

CO2: Discuss Algebra of Linear Transformations and Characteristics root

CO3: Study canonical forms and Nilpotent transformationsfor the development of skills and employability.

CO4: Analyze rational canonical forms and Determinants.Understand the Hermitian, Unitary and Normal Transformationsfor the development of skills and employability.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	1	2	2	1	2
CO2	2	2	2	1	2	2	1	2
CO3	2	2	1	3	1	3	2	2
CO4	1	2	2	2	1	3	2	1

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

References:

1. Brief Survey of Modern Algebra, Brikhoff and Maclane, IBH
2. Elementary Linear Algebra with Applications, Keith Nicholson, PWS – Kent PublishingCompany
3. Introduction to Linear Algebra by Stewart, Van Nostrand Co. Ltd.
4. Linear algebra – a geometric approach by Kumaresan. S, Prentice Hall India Learning Private Limited
5. Linear Algebra by Larry Smith, Spinger Verlag.
6. Linear Algebra by Serge Lang, Addison Wesley Publishing company Inc.
7. Linear Algebra, SurjithSinth, Vikas Publishing House Pvt. Ltd.
8. Modern Algebra by Vasishta, Krishna Prakashan Media Ltd.
9. Modern Algebra, Vol.II, by Narayanan and Manicavachagam Pillay, S. Vishwanathan and Co.
10. Theory and Problems of Linear Algebra, Saymour Lipschitz, Schaum's outline, TMH Publishing Co**.**
11. Vector Algebra, Shantinarayan and P K Mittal, S Chand and Co. Ltd.

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VII

External: 70
Internal: 30
Total: 100

BSCBED734: CELL BIOLOGY, GENETICS AND EVOLUTION

Course Objectives:

The objectives of the course are to help the students to learn and develop an understanding of a cell as a basic unit of life. This course is designed to enable them to understand the functions of cellular organelles and how a cell carries out and regulates cellular functions.Unknown to them, human beings had been applying the principles of genetics by engaging in selective breeding of domesticated animals for many centuries.However, it was only with the work of Mendel and advent of 20th century, that basic principles of the science of genetics were formulated to develop skills.

Course Content:

Unit- I

CELL AND CELL ORGANELLES – I

Prokaryotic and Eukaryotic cells: Plant and animal cell differences, Cell theory; Protoplasm and its properties; Cytoskeleton – Microtubules, Microfilament. Cell membrane – Ultrastructure, fluid mosaic model and functions; Structures and functionsof Endoplasmic Reticulum, Mitochondria, Golgi complex, Ribosomes and Lyssosomesto inculcate skill and employability

Unit- II

CELL ORGANELLES – II and GENETICS – I

a) **Nucleus** – structure (nuclear membranes, nucleoplasm and nucleolus).
b) **Chromosomes** – Structure of eukaryotic chromosome (nucleosome model), giant chromosome – Polytene and lampbrush chromosomes; Mitosis and Meiosis, Cell-cycle and regulation
c) **Inheritance**: Mendel's Laws, Monohybrid cross, dihybrid cross, test cross
d) **Deviation of Mendelism**: Incomplete dominance and codominance
e) **Interaction of genes**: Epistasis – (dominant and recessive) Complimentary genes; multiple gene–inheritance of skin colour in man; Multiple alleles – inheritance of coat colour in rabbit, and ABO blood groups in man

Linkage and crossing over: Types, process and significancesto inculcate skill and employability

Unit -III

GENETICS - II

a) **Sex determination:** Genetically controlled mechanism (sex chromosome mechanism, genic balance mechanism, haplo-diploidy mechanism); sex determination in humans; Barr body, Structure of Y chromosome and sex determining genes in human.

b) **Sex linked inheritance:** Sex linked inheritance in *Drosophila* (eye colour) and humans; sex limited and sex influenced characters

c) **Cytoplasmic inheritance:** (i) Kappa particles in *Paramecium*

Chromosomal aberrations: Structural and numerical aberration in human (Syndromes)to inculcate skill and employability.

UNIT- IV

EVOLUTION

a) **Origin of Life:** Theories on origin of life, Urey Miller's experiment

Theories of Evolution: Lamarckism and Darwinism, Neo-Lamarckism, de Vries theory of mutation and its significance in evolution; Hardy-Weinberg's Law, Genetic drift, Modern synthetic theory of evolution; Concept of species and speciation; brief Evolution of manto inculcate skill and employability

Course outcomes:

After completion of the course, students will to be able to:

CO1: Have a deeper understanding of the varied branches of the biological sciences like microbiology, evolutionary biology, genomics and metagenomics to inculcate skill and employability

CO2: Understand fundamental principles of cell biologyto inculcate skill and employabilityCO3: Explain structure and functions of cell organelles involved in diverse cellular processes for the development of skills and employability.

CO4: Gain knowledge of the basic principles of inheritanceto inculcate skill and employability

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	3	3	2	1	2	1
CO2	2	2	3	2	2	2	1	2
CO3	2	2	2	2	2	2	1	1
CO4	1	2	3	1	1	2	3	1

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

References:

1. Cell and Molocular Biology by P.K. Gupta – (Rastogi Publications, 2008).
2. Cell Biology by C.B.Powar – (Himalya Publishing House, Bombay).
3. Cell Biology by De Robertis*et.al*– (W.B. Saunders, Philadelphia).
4. Genes (Vol. I – VII) by Levin B. – CBS Publishers.
5. Cytology, Genetics & Evolution by Gupta PK (1992) – Rastogi Publications.
6. Principles of Genetics by Sinnott, Dunn and Dobzhansky – (McGraw Hill).
7. Cytogenetics by P.K. Gupta – (Rastogi Publications, 2008).
8. Evolutionary Biology by B.S. Tomar& S.P. Singh – (Rastogi Publications, 2008).
9. The origin of life by K.John – (Reinhold Publishing Corpn).
10. The evolution of Man by G.W.Lasker – (Holt, Rinehart & Winston).

Website Sources:

- https://swayam.gov.in/course/150-cell-biology
- https://swayam.gov.in/courses/5173-biochemistry-and-cell-biology
- https://www.jove.com/science-education-library/9/cell-biology
- https://swayam.gov.in/courses/4922-genetics-and-genomics
- https://www.coursera.org/learn/genetics-evolution

Note: Latest editions of all the suggested readings must be used.

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VII

External: 25
Internal: 25
Total: 50

BSCBED753: PRACTICAL (ZOOLOGY)

Course Objective:

The course will help in building sound fundamental knowledge of the principles of genetics, to be used as a stepping stone for higher studies and research in this field. It is designed to enable them to understand the functions of cellular organelles and how a cell carries out and regulates cellular functionsto inculcate skill, provide employability and entrepreneuriel skills.

Course Content:

List of experiments

1. Staining of mitochondria in the buccal epithelial cells of man.
2. Preparation of mitosis in onion root tips.
3. Micrometry: Use of ocular and stage micrometers to measure cell and nucleardimensions of human buccal epithelial cells/Study of Barr body.
4. Preparation of slides of grasshopper (*Poecilocerus pictus*) testis for the various stages ofmeiosis.
5. Preparation of salivary gland chromosomes of chironomous larva forbanding patterns.
6. Study of Karyotype and idiogram of man.
7. Culture of *Drosophila* – Collection, handling, rearing and maintenance of culture: a)Identification of sexes of *Drosophila*, b) Study of the life cycle of *Drosophila*.
8. Sorting out and study of mutant flies of *Drosophila* with reference to their variouscontrasting characters in comparison with normal flies-vestigial wings, ebony body, curled wing, sepia eye, white eye and bar eye.
9. Identification of blood groups (ABO) and Rh factor in man.
10. Study of fossil models of Trilobites and fishes/Archaeopteryx.
    Study of cranial capacity and feature of skulls of prehistoric to modern manfor the development of skills and employability.

Project 1: Conducting breeding experiments to verify the law ofsegregation, law of independent assortment and law of sex linkedinheritance.

OR

Project 2: Analysis of inheritance of selected traits in human population; PTU–test, bloodgroup distribution pattern, rolling of tongue, ear lobe attachment, baldness etc.

Course outcomes:

After completion of the course, students will to be able to:

CO1: Understand fundamental principles of cell biologyto inculcate skill and employability.

CO2: Explain structure and functions of cell organelles involved in diverse cellular processesto inculcate skill and employability

CO3: Appreciate how cells grow, divide, survive, die and regulate these important processesto inculcate skill and employability

Refrences:

1. A manual of practical zoology: biodiversity, cell biology, genetics & developmental biology part 1 (M.M. Trigunayat).
2. Laboratory Manual of Cell Biology (Rina Majumdar, Rama Sisodia).

Website Sources:

- https://sjce.ac.in/wp-content/uploads/2018/04/Cell-Biology-Genetics-Laboratory-Manual-17-18.pdf
- https://oer.galileo.usg.edu
- http://www.biologycorner.com

Note: Latest editions of all the suggested readings must be used.

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VII

External: 70
Internal: 30
Total: 100

BSCBED735: CELL BIOLOGY AND GENETICS

Course Objectives:

The objective of the present course content is to provide a foundation and background in cellular and acellular entities of plants and animals, Ultra structure of cell and its organelles in relation to functions, Chromosomal aberrations and Mutations, Cell cycle. This course will also deal with Mendelian and non-Mendelian inheritancefor inculcating skills, provide employability andentreprepreneuriel skills.

Course Content:

Unit- I

CELL BIOLOGY

a) Ultrastructure of prokaryotic and eukaryotic cells.
   Cell- organelles: Ultrastructure and functions of plant cell wall, plasma membrane, Golgi complex, Endoplasmic reticulum, Mitochondrionfor the development of skills and employability.

Unit -II

Ultrastructure and functions of chloroplast, ribosome, lysosome and microbodies.

a) Nucleus – Ultrastructure of eukaryotic nucleus.
   Chromosomes – Brief account of morphology and organization of prokaryotic and eukaryotic chromosome; Nucleosome model, concept of karyotype and idiogram (brief)for the development of skills and employability.

Unit -III

a) Chromosomal alterations: (i) Structural variations – Deletion, Duplication, Translocationand Inversion. (ii) Numerical Variations – Aneuploidy and euploidy.
b) Cell Division : Cell-cycle, events of cell division, karyokinesis, cytokinesis, cell-cycle; Mitosis, Meiosis and their significanceto inculcate skill and employability

Unit- IV

GENETICS

a) Mendelism –Mendel's laws of inheritance, solving problems related to Mendel's laws.
b) Inheritance of genes: Incomplete dominance, complementary gene action (flower colour in sweet pea), supplementary gene action (coat colour in mice), epistasis (fruit colour in summer squash), multiple factor inheritance (ear size in maize).
c) Sex determination in plants – Melandrium.

d) Cytoplasmic inheritance – plastid inheritance in Mirabilis, cytoplasmic male sterility in maize.

Genetic variations: Mutations – spontaneous and induced, transposable genetic elementsfor the development of skills and employability.

Course Outcomes:

On completion of the course, students will able to understand:

CO1: Difference between prokaryotic eukaryotic cell and ultra structure of plant cellto inculcate skill and employability

CO2: Structure and functions of cell organellesto inculcate skill and employability

CO3: The eukaryotic cell cycle and mitotic and meiotic cell divisionfor the development of skills and employability.

CO4: Structure and chemistry of chromosomes, types of chromosomesfor the development of skills and employability.

Mapping Course Outcomes(COs) leading to the achievement of Programme Outcomes(POs): (Please write 3,2,1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	1	2	1	1	2	1
CO2	1	1	1	1	2	2	2	1
CO3	3	2	1	2	2	3	1	2
CO4	3	2	3	2	1	3	2	2

CO-Curriculum Enrichment Mapping(Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1

References:

1. Atherly, A.G. J.R.Girton and J.F.MacDonald, 1999, The Science of Genetics, Saunders College Publishing, Fortworth, USA.
2. Gardner, A., 1990, Principles of Genetics (6th Ed.), John Wiley & Sons Inc., USA.
3. Gunning, B.E.S. and M.W.Steer 1999, Plant Cell Biology, Structure and Function, Jones & Bartlett Publishers, Boston, Massachusettes.
4. Gupta P.K. 2000, Cytology, Genetics and Evolution, Rastogi Publications, Meerut.
5. Gupta, P.K. 2005, Elements of Genetics, Rastogi Publications, Meerut.
6. Gupta, P.K.1999, A Textbook of Cell and Molecular Biology, Rastogi Publications, Meerut.
7. Harris, N. and K.J.Oparka, 1994, Plant Cell Biology: A Practical Approach, IRL Press, Oxford Univ.Press, Oxford, UK.
8. Russel, P.J. 1998, Genetics, The Benjamin/Cummings Publishing Co. Inc., USA.
9. Singh, S.P. and B.S.Tomar, 2006, Cell Biology, Rastogi Publications, Meerut.
10. Snustad D.P. and M.J.Simmons 2000, Principles of Genetics, John Wiley & Sons, Inc. USA.
11. Wolfe, S.L. 1993, Molecular and Cell Biology, Wadsworth Publishing Co., California, USA.

Website Sources:

- *en.wikipedia.org*
- *onlineecourses.nptel.ac.in*
- www.digitalbookindex.org
- www.freebookcentre.net
- www.pdf.com
- www.pdfdrive.com/botany-books.html
- *www.topfreebooks.org ›*
- www.yourarticlelibrary.com
- *www1.biologie.uni-hamburg.de*

Note: Latest editions of all the suggested readings must be used.

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VII

External: 25
Internal: 25
Total: 50

BSCBED754: PRACTICAL (BOTANY)

Course Content:

The main Goal of this subject is to share the knowledge to the students about the experiments. The students will get a better understanding of the concept studied by them in theory course and correlate with experimental observations to inculcate skill, provide employability andentreprepreneuriel skills.

Course Content:

1. Comparative study of cell structure in onion cells, Hydrilla and Chara/Spirogyra.
2. Study of cyclosis in Tradescantia staminal cells.
3. Study of plastids to examine pigment distribution in plants (e.g. Cassia, Lycopersiconand Capsicum)
4. Examination of electron micrographs of virus, bacteria, Cyanobacteria. and eukaryoticcells with special reference to organelles;
5. Study of various stages of mitosis and meiosis by preparing slides of suitable plantmaterials (onion root tips and onion flower buds).
6. Working out the laws of inheritance using seeds/ beads.

Working out genetic problems related to Mendelian laws of inheritance and interactionof genesto inculcate skilland employability.

Course Outcomes:

After successfully completing this course, the students will be able to:

CO1: Understand the various stages occurred in mitotic and meiotic cell divisionsto inculcate skilland employability.

CO2: Apply quantitative problem-solving skills to genetics problems and issues to inculcate skillCO3: Select and apply experimental procedures to solve genetic problems for skill development.

CO4: Perform the emasculation technique in various crop plants for skill development and employability.

CO5: Know cell structures of Onion cell, *Hydrilla* and *Chara/Spirogyra* cell for skill development and employability.

References:

1. A text Book of Practical Botany 2 by Bendre and Kumar.
2. Practical Biotechnology by R.S.Gaud.

Website Sources:

- https://oer.galileo.usg.edu
- http://www.biologycorner.com

Semester –VIII								
Course	**Code**	**Subject**	**Title**	**Credit**	**Internal**	**External**		**Total**
						Theory	**Practical**	
PEC 1	BSCBED821		Educational Administration and Management	4	30	70	--	100
PEC 2	BSCBED822		Guidence and Counselling in Schools	4	30	70	--	100
PEC 3	BSCBED855		**Practicum:** Reading & Reflection on Text	4	100	--	--	100
Subjects - As per semester I								
Group – A								
GEC 1	BSCBED831	Chemistry	Spectrocopy, Natural Products and Heterocyclics	3	30	70	--	100
	BSCBED851		Practical	1	25	--	25	50
Group – B								
GEC 2	BSCBED832	Physics	Solid State Physics	3	30	70	--	100
	BSCBED852		Practical	1	25	--	25	50
	BSCBED833	Mathematics	Complex Analysis and Numerical Analysis	4	30	70	--	100
Group – C								
GEC 3	BSCBED834	Zoology	Biochemistry, Molecular Biology and Biotechnology	3	30	70	--	100
	BSCBED853		Practical	1	25	--	25	50
	BSCBED835	Botany	Molecular Biology, Biochemistry and Biotechnology	3	30	70	--	100
	BSCBED854		Practical	1	25	--	25	50
Total Marks (PCM Group)								400
Total Marks (ZBC Group)								450
Total Semester Marks (PCM Group)								***700***
Total Semester Marks (ZBC Group)								***750***
Total Fourth Year Marks (PCM Group)								***1400***
Total Fourth Year Marks (ZBC Group)								***1500***

PEC = Professional Education Component (PEC)
GEC = General Education Component (GEC)

IFTM UNIVERSITY, MORADABAD
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SEMESTER- VIII

External: 70
Internal: 30
Total: 100

BSCBED821: EDUCATIONAL ADMINISTRATION AND MANAGEMENT

Course Objectives:

The purpose of this course is to expose students:

- To understand the concept and concerns of educational administrationfor skill development.
- To understand the role of the headmaster and the teacher in school management.
- To understand the concept and importance of communication and its possible barriers in educational administrationfor better understanding of entrepreneurial skills.
- To critically analyze the administrative scenario in relation to the functioning of the other secondary schools of the area.
- To explain the scientific practices of educational management and keep him/her to apply it in work situationfor skill development and employability.

Course Content:

Unit-I

Conceptual framework: concept of educational administration.
Concept of educational management, human beings as inputs, process and products.
Total quality management- concept and its significance to schoolfor skill development.

Unit -II

Role and functions of headmaster/teacher: basic functions of administration planning, organizing directing and controlling. Maintenance of disciplines, control in management. Educational Supervision and inspection, defects in the present supervision and inspection. Scope of educational supervision, Types of supervision. Providing guidance, leadership function. Crisis in Management, Decision Making for development of entrepreneurship skills.

Unit -III

Management of schoolsfor skill development and employability: role of headmaster in planning of school activities approaches to management manpower approach, cost benefit approach, social demand approach, social justice approach. Delegation of authority and accountability. Role of headmaster in motivating the staff, in resolution of interpersonal conflicts. Role of the headmaster in creating resources and managing financial matters. Optimum use of available resources for growth and development of the school, Staff development programs, Role of teachers in school management and administration, Teacher as a successful classroom manager.

Unit -IV

Budget (School), Instutional Planning, Administrative Structure in the field of Education in Centre, State, District and Local Level. Role and Function of the Board of Secondary Education in Controlling Secondary Schools and Problems of Government Secondary School's Administration, Administration of University Education in India for better employability in education sector.

Course Outcomes:

After the completion of the course, Students will be able:

CO1: Ensure adequate utilization of all resources.
CO2: Ensure professional ethics, skills, entrepreneurship and professional developmentand satisfying national and global needs.
CO3: Mobilize the community.
CO4: Ensure qualitative improvement of educationfor skill development and fulfill national and global needs.

PO-CO-Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	3	2	1	2	2	3
CO2	3	3	2	2	2	2	3	2
CO3	3	3	2	3	1	1	3	3
CO4	1	1	3	1	3	3	1	3

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	2
CO2	3	2	3
CO3	3	3	3
CO4	3	2	2

References:

- Mittal, M.L.; Education administration & management.
- Mathur, S.S.; Education administration & management.
- *vk;Z*] eksguyky ¼2014½(**'kSf{kdiz"kklu ,oaizcU/ku**(lw;kZizdk"ku ¼vkj0 ykycqd fMiks½] esjBA
- *vk;Z*] eksguyky ¼2016½(**'kSf{kdiz"kklu ,oaizcU/k**(lw;kZizdk"ku ¼vkj0 ykycqd fMiks½] esjBA
- 'kekZ*] vkj0 ,0 ¼2008½(**'kSf{kdiz"kklu ,oaizcU/ku**(lw;kZizdk"ku ¼vkj0 ykycqd fMiks½] esjBA

Website Sources:

- https://ddceutkal.ac.in/Syllabus/MA_Education/Paper_8.pdf

- http://egyankosh.ac.in/handle/123456789/49329

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VIII

External: 70
Internal: 30
Total: 100

BSCBED822: GUIDANCE AND COUNSELLING IN SCHOOLS

Course Objectives:

The purpose of this course is to expose students:

- To develop the understanding of the need and importance of career information for e-pupils
- To identify their role and function in locating, collecting, evaluating and disseminating career information for the use of pupilsfor skill development.
- To develop an understanding of how one's ability, interests and aptitudes are related to world of workfor skill development, employability and entrepreneurship development.
- To know about the importance of developing the right attitudes and values at every stage of education.

Course Content:

Unit I Meaning and Nature of Guidance

Guidance: Concept, aims, objectives, functions and principles.Need & Procedure for (Educational, Psychological and Social) guidance.Purposes and Principles of organization of different Guidance ServicesOrganization of guidance services at Secondary Level: Need and ImportanceGroup Guidance: Concept, Need, Significance and Principles, Organization of Guidanceprograms in schools.Role of Guidance Personnel in organization of guidance services in School: Counsellor,Career Master, Psychologist, Doctor, Teacher Counsellor, Head of the Institution, Teacher,Social Worker

Unit II Meaning and Nature of Counsellingfor development of various skills.

Counselling: Meaning and nature; Difference between Guidance &Counselling; Principlesand approaches of counselling, Individual and Group Counselling; Skills in Counselling-Skills for Listening, Questioning, Responding, & Communicating. Methods and Process of CounsellingAcademic, Personal, Career and Behaviour problems of students with special needs, viz.socio-emotional problems of children with disabilities and deprived groups such as SC, STand girls, need for Counselling; Professional Ethics and Code of Conduct; Qualities andQualifications of an effective Counsellor

Unit III Tools and Techniques of Guidance

Testing and Non-Testing Techniques for Studying and Appraisal of students:

a) TestingTechniques: Intelligence/Mental Ability tests, Aptitude Tests, Attitude Scales, Interestinventories, and Personality Tests,

b) Non-testing Techniques: Interview, Observation andCase Study, c) Tools-Questionnaire, Anecdotal Record, Cumulative Record Cards, etc.Role of the teacher in Assessment and Testing.

Unit IV Career Guidance and Counselling

Educational and Career Information in Guidance and Counselling: Meaning, Importance,collection, types, classification of occupational information; Dissemination of OccupationalInformation: Class talk, career talk, Group discussion, Preparation of Charts and Poster,Career Exhibition, Career conference; Guidance for gifted, slow learner, socio-economicallydisadvantaged children; Career development for entrepreneurship development: Meaning and Importance; Teacher's role inCareer planning, Vocational training and placement opportunities for CWSN. Broad outlinewith respect to the emerging courses and career options available in India; Guidelines forEstablishment of Guidance Cell or Career Corners in Schoolsfor employability.

Course Outcomes:

After undergoing this course the student will be able to:

CO1: Understand the needs to address the children with diversities in classroom for skill development.

CO2: Identify the causes for classifying various diversities.Acquainted about the policies and programmes for inclusive children for skill development.

CO3: Differentiate between disability and inclusion.Specify the implementation of inclusion to normalize the children with diversitiesso as to meet their local needs.

CO4: Apply supportive services to children the diversities in mainstream and provide them guidance and counselling for better skills and adjustment in society.Apply software on assistive devices in inclusive schools.

PO-CO-Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	2	1	2	3
CO2	2	1	1	3	1	2	3	2
CO3	3	3	3	3	2	3	1	3
CO4	2	3	3	2	1	2	2	3

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	3	2
CO2	3	2	2

CO3	2	3	3
CO4	3	**2**	**2**

References:

- Agarwal, J.C.: Educational & vocational guidance & counselling.
- Aggarwal, J. C. (2004). Educational Vocational Guidance and Counselling, Delhi:Doaba House.
- Asch, M. (2000). Principles of Guidance and Counselling, New Delhi: Sarup and Sons.
- Bhatia, K. K., (2002). Principles of Guidance and Counselling, Ludhiana: VinodPublications.
- Bhatnagar, R. P.; Rani. S. (2001); Guidance and Counselling in Education andPsychology.
- Chauhan, S. S. (2008). Principles and Techniques of Guidance. UP: Vikas PublishingHouse Pvt. Ltd.
- Coorey, S.M (1953).Action Research to Improve School Practices, New York:Teacher's Columbia University.
- Gibson, R.L. and Mitchell (2008). Introduction to Counselling and Guidance. NewDelhi: PHI Learning Pvt. Ltd.
- Granz, R. M. (2005). Foundation and Principle of Guidance, Boston: Allyn& Bacon.
- Gupta, V. K. (2004). Educational Guidance and Counselling, Ludhiana: AnkurPublications.
- Joneja G. K. (1997); Occupational Information in Guidance, NCERT publication.
- Jones, J. A. (1970). Principles of Guidance, Bombay: Tata, New York: McGraw Hill.
- Kakkar, S.B (2015) Educational Psychology, *PHI Learning: Publications*
- Kocher, S. K. (2007). Educational Guidance and Counselling, New Delhi: Sterling.
- Myres, G. E. (2005). Principles and Techniques of Vocational Guidance, New York:McGraw Hill.
- Nanda, S. K.and Sagar, S. (1972). Fundamentals of Guidance. Chandigarh: N.B.S.Educational Publishers.
- Nayak A.K. (2004); Guidance and Counseling.
- NCERT (2005). National Curriculum Framework-2005,NCERT,New Delhi
- NCERT (2008). Counselling Process and Strategies (Module 2). New Delhi: NCERT.
- NCERT (2008). Guidance for Human Development and Adjustment (Module3) NewDelhi: NCERT.
- NCERT (2008). Introduction to Guidance (Module 1). New Delhi: NCERT.
- Oberoi, S.C.: Career information in career guidance.

Website Sources:

- http://oer.avu.org/bitstream/handle/123456789/153/GUIDANCE%20AND%20COUNSELING.pdf?sequence=1
- http://www.apa.org/ethics/code/principles.pdf
- http://www.ncert.nic.in/departments/nie/dse/activities/advisory_board/pdf/guidelines_for_guidance_and_counseling.pdf
- http://www.egyankosh.ac.in/

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SEMESTER- VIII

External: 00
Internal: 100
Total: 100

BSCBED855: *PRACTICUM:*READING AND REFLECTING ON TEXT

Course Objective:

This course will serve as a foundation to enable student-teachers to read and respond to a variety of texts in different ways depending on the purposes of reading, like-personal or creative or critical or all of these.

Course Content:

Reading – Meaning and Process, Importance of Reading across Curriculum, Characteristicsof Reading, Developing reading skills.Role of libraries in promoting reading habits. Levels of reading – literal, interpretative, critical and creative, Types of reading – intensiveand extensive reading, oral & silent reading, Reading techniques – skimming and scanning.Methodology of reading. Types of Texts – Narrative, expository, descriptive, suggestive, empirical, conceptual,ethnography, policy documents, field notes; Importance of Different Texts in Curriculum. Developing Critical Reading Skills, Developing Reflective Skills, Activities for DevelopingReading Skills, Developing Metacognition for Reading, Developing Reading ComprehensionDeveloping Vocabulary for Reading, Problems of Reading.

This course will serve as a practicum to enable student-teachers to read and respond to a variety of texts in different ways depending on the purposes of reading, like-personal or creative or critical or all of these. Student-teachers are expected to sit in the library regularly and to review at least 03-books of different categories in about 500 words each. These may be as follows –

- Review of text books related to core courses
- Review of reference Book related to core courses
- Review of Text Books related to Pedagogy courses
- Review of Reference to Book related to Pedagogy courses.

- Review of Policy Documents, Autobiography, Commission Reports, etc.
- Review of studies about school, historical books and other educational miscellaneous books.

Course Outcomes:

After undergoing this course the student will be able:

CO1: To develop study – habits develop skill of reading & writing and develop skill of summarization.
CO2: To develop skill of note-taking.
CO3: To develop the reading capacity.
CO4: To develop the creative ability, logical ability, analytical power, thinking skill and reading skill.
CO5: To develop the methods and approaches about reading for developing skills.
CO6: To know the measurement and evaluation of reading.
CO7: To understand the co-relation among different subject.
CO8: To know the diagnostic and remedial of reading.
CO9: To be motivated to writing on different topic and to be aware of difficulties or Reading and writing.
CO10: To develop the interest in reading and writing.
CO11: To be motivate for discussion in small groups by reading and writing.
CO12: To learn to care for books.
CO13: To learn to use reading and writing work done in classroom.
CO14: Best qualities can develop in student teacher due to best reading and writing.
CO15: Be motivated to bring essential changes in their lifestyle because of best type of reading and writing.

References:

- Bright, J.A., and McGregor, G.P. (1970). *Teaching English as a Second Language.* ELBS: Longman.
- Doff, A. (1988). *Teach English: Training Course for Teachers.* Cambridge:Cambridge University Press.
- Hill, L.A., and Dobbyn, M.A. (1979). *Training Course, Trainer's Book.* London:Cassell.
- Hubbard, P., and Hywel, J. et al (1983). *A Training Course for TEFL.* OxfordUniversity Press.
- Joseph, K.S. (2004). *Self Instruction in English Grammar and Figures of Speech* Vadodara: Gold Rock Publications.
- Mukalel, J.C. (1998). *Approaches to English Language Teaching.* New Delhi:Discovery publishing house.
- Mukalel, J.C. (1998). *Creative Approaches to Classroom Teaching.* New Delhi:Discovery publishing house.

- Mukalel, J.C. (1998). *Psychology of Language Teaching.* New Delhi: DiscoveryPublishing House.
- Mukalel, J.C., and Ahmed, S. B. (1984). *Teaching English in India.* New Delhi: AryaBook Depot.
- Nagaraj, G. (1996). *English Language Teaching Approaches, Methods.*

Website Sources:

- https://www.ncertbooks.guru
- http://sabarishedn.blogspot.com/2016/03/epc-1-reading-and-reflecting-on-texts.htmlhttp://www.ignouhelp.in
- http://www.egyankosh.ac.in/bitstream/123456789/53429/1/Block-1.pdf
- http://ggite.ac.in/namaste-lesson/epc-1-reading-and-reflecting-on-texts

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
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B.Sc.-B.Ed. Integrated Programme
SEMESTER- VIII

External: 70
Internal: 30
Total: 100

BSCBED831: SPECTROSCOPY, NATURAL PRODUCTS AND HETEROCYCLICS

Course Objectives:

The main aim of Heterocyclic compounds study is to develop knowledge and skills:

- To develop novel, efficient,convenient, selective and environmentally benign synthetic methods in organicchemistry.
- To develop greenmethodologies for the synthesis of nitrogen containing heterocyclic.
- To understand the basic features of spectroscopy in order to study the NMR spectroscopy to understand the important role of nuclearmagnetic resonance spectroscopy in the study of the structures of organic compounds.
- To develop an understanding of the significance of the number, positions, intensitiesandsplitting of signals in nuclear magnetic resonance spectra.
- To assign structures to simple molecules on the basis of nuclear magneticresonance spectra

Course Content:

Unit I Spectroscopy

UV and Visible spectroscopy: Introduction, absorption laws, instrumentation, formation ofabsorption bands, types of electronic transitions, chromophores, auxochromes, absorption andintensity shifts, solvent effects.

IR spectroscopy: Introduction, theory of molecular vibrations, vibrational frequency, factorsinfluencing vibrational frequencies, finger print region and applications of IR spectroscopyfor the development of knowledge and skills.

NMR spectroscopy: Introduction, instrumentation, number of signals, position of signals(Chemical shift), shielding and deshielding effects, factors influencing chemical shiftsinductiveeffect, anisotropic effect and hydrogen bonding. Splitting of signals, spin-spincoupling, chemical exchange and coupling constant.Structural determination of simple organic compounds using UV, IR and NMR spectral data.

Unit II Natural Products

Carbohydrates: Introduction, classification and nomenclature. Configuration ofmonosaccharides. Erythro and threo diastereomers. Interconversions in carbohydrates – glucose to fructose, fructose to glucose, aldopentose to aldohexose and aldohexose toaldopentose. Epimerisation, mechanism of osazone formation, Determination of ring size of monosaccharides. Structural elucidation ofD(+) glucose. Mechanism of Mutarotation. Constitution of disaccharides - maltose, sucroseand lactose.

Amino acids, Peptides, Proteins and Nucleic acids

Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectricpoint and electrophoresisproteins. Peptide structure determination - peptides. Nucleic acids: Introduction, constituents of nucleic acids. The double helical structure of DNAfor the development of enrepreneurship and skills.

Unit III Dyes, Drugs and Macromolecules

Dyes: Introduction, Classification of dyes, Colour and constitution (electronic concept),synthesis and uses of Methyl orange, Phenolphthalein, Fluorescein and Indigo.

Drugs: Introduction, classification.

Macromolecules: Introduction, Classification, Types of polymerization – chainpolymerization, step polymerization, free radical polymerization, co-polymerisation, Ionicpolymerization, Coordination polymerization. Natural and synthetic rubbers – buna S. Synthetic fibres – nylon 6, nylon 6, 6. Conducting polymers.

Unit IV Heterocyclic Compounds

Introduction, methods of formation of five membered heterocycles – furan, thiophene andpyrrole. Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiopheneand their chemical reactionsfor skill development. Six membered heterocycles: methods of formation of pyridine.Comparison of basicity ofpyridine, piperidine and pyrrole.

Course Outcomes:

CO1: The students should be able to demonstrate advanced knowledge, skills and understanding inaspect of protein structure.

CO2:The students will be able to introduce about basic chemistry of the heterocyclic, familiar with particular properties and reactions for the mostimportant heterocyclic as well as different systems of nomenclature.

CO3:Able to recognize different regions for different spectroscopy.

CO4:After completion of course students should have the ability to identify organiccompounds by analysis and interpretation of spectral data.

CO5:Students should have the ability to explain common terms in NMR spectroscopy such aschemical shift, coupling constant and anisotropy and describe how they are affected bymolecular structure.

PO-CO-Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	3	2	2	1	2	3
CO2	2	1	1	3	1	2	3	2
CO3	3	3	3	3	2	3	1	3
CO4	2	3	3	2	1	2	2	3
CO5	2	2	1	2	2	3	2	2

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	1	1
CO3	3	1	2
CO4	3	1	1
CO5	3	1	2

References:

1. Organic Spectroscopy by P S Kalsi.
2. Organic Chemistry: I L FinarVol II.
3. Application of absorption Spectroscopy to Organic Compounds: John R Dyer.
4. Organic Spectroscopy: William Kemp.
5. Fundamentals of Molecular Spectroscopy: C N Banwell.

Website Sources:

- https://www.gopracticals.com/basic-engineering/
- https://edu.rsc.org/resources/practical
- https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US

Note: Latest editions of all the suggested readings must be used

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
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SEMESTER- VIII

External: 25
Internal: 25
Total: 50

BSCBED851: PRACTICAL (CHEMISTRY)

Course Objectives:
The objectives of the course are:
- To synthesize different organic compounds.
- To know two step organic synthesis.
- To understand quantitative organic analysis.

Course Contents:
1. Two step organic synthesisfor skill development.
1. Synthesis of p-bromoaniline from acetanilide
2. Preparation of o-iodobenzoic acid from anthranilic acid
3. Preparation of m-nitrobenzoic acid from methyl benzoate
4. Preparation of Paracetamol
5. Synthesis of Quinoline

2. Quantitative organic analysisfor skill development.
1. Estimation of aniline/ phenol by bromate-bromide method
2. Estimation of glucose by Fehlings method/ Spectrophotometry using 3,5 dinitrosalicylic acid
3. Determination of iodine value of oil by Wij's method/ Chloramine-T method
4. Determination of saponification value of an ester / oil
5. Estimation of amino acid by formal titration method
6. Estimation of ascorbic acid in Vitamin C tablets by Volumetry
7. Estimation of Paracetamol by titrimetric and spectro photo metric methods.
8. Colorimetric Estimation of proteins by Biuret method

Course Outcomes:
After the completion of the course, Students will be able:
CO1. To know iodine value of oilfor skill development.
CO2. To know the estimation of ascorbic acid in Vitamin C for skill development.
CO3. To know the preparation of organic compounds of pharmaceutical use for skill development.

References:

1. A Text Book of Qualitative Organic Analysis, A I Vogel.
2. A Text Book of Quantitative Organic Analysis, A I Vogel.
3. Systematic experiments in Chemistry ArunSethi, New Age International (P) Ltd.
4. Organic synthesis-special techniques V.K. Ahluwalia, 2nd Edition NarosaPublishingHouse.
5. Organic Synthesis A.I. Vogel.

Website Sources:
- https://www.gopracticals.com/basic-engineering/

- https://edu.rsc.org/resources/practical
- https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US

Note: Latest editions of all the suggested readings must be used

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B.Sc.-B.Ed. Integrated Programme
SEMESTER- VIII

External: 70
Internal: 30
Total: 100

BSCBED832: SOLID STATE PHYSICS

Course Objective:

This course introduces the basic concepts and principles required to understand the various properties exhibited by condensed matter, especially solidsfor skill development.

Course Content:

Unit I Crystal Structure

Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis. Unit Cell. Miller Indices. Interplanar spacing.Types of Lattices. Brillouin Zones. Coordination number, packing fraction for cubic crystals(sc, bcc and fcc). Diffraction of X-rays by Crystals. Bragg's Lawfor development of skills and knowledge.

Unit II

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic andDiatomic Chains. Acoustical and Optical Phonons. Dulong and Petit's Law, Einstein and

Unit III

Electrical Properties: Free electron model of a metal, solution of one dimensionalSchroedinger equation in constant potential, Density of states. Fermi energy, Energy bands insolids, Distinction between metals, semiconductors and insulatorsfor development of skills and employability. Kronig- Penney model.P and N type Semiconductors. Conductivity of Semiconductors, mobility.

Unit IV Superconductivity

Superconductivity: Qualitative description,. Experimental Results. Critical Temperature.Critical magnetic field. Meissner effect. Type I and type II Superconductors, London'sEquation and Penetration Depth.

Course Outcomes:

Students completing this course will be able to:

CO1. Understand the concept of reciprocal space lattice and know the significance of Brillouin zones.

CO2. Describe the main features of the physics of electrons in solids: origin of energy bands, and their influence electronic behaviorfor skill development.

CO3. Distinguish between metals, semiconductors and insulators.

CO4. Describe Kronig- Penney model.Understand Photoconductivity & Luminescence. Understand the basics of superconductors, their types and applications.

PO-CO-Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	2	2	3	2	3
CO2	1	3	1	3	1	2	3	2
CO3	3	3	3	3	2	3	1	1
CO4	2	2	3	1	2	2	2	3

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability.	Entrepreneurship Development
CO1	3	2	2
CO2	3	2	2
CO3	3	2	1
CO4	3	2	2

References:

1. Charles Kittel, Introduction to Solid State Physics, 8th Ed., Wiley India Pvt. Ltd., 2004.
2. A J Dekker, Solid State Physics, Macmillan, 1965.
3. J.P. Srivastava, Elements of Solid State Physics, 2nd Ed., Prentice-Hall of India, 2006.
4. Leonid V. Azaroff, Introduction to Solids, Tata Mc-Graw Hill, 2004.
5. M. A. Wahab, Solid State Physics: Structure and Properties of Materials, Alpha Science International, Ltd., 2005.
6. Neil W. Ashcroft and N. David Mermin, Solid State Physics, Cengage Learning, 1976.
7. S O Pillai, Solid State Physics, NEW AGE, 2009.
8. G. I. Epifanov, Solid State Physics, Central Books Ltd., 1979.
9. M. Ali Omar, Elementary Solid State Physics, Pearson India, 1999.
10. H. Ibach and H Luth, Solid-state Physics, Springer, 2009.

Website Sources:

- https://lampx.tugraz.at
- http://www.egyankosh.ac.in
- https://www.phys.sinica.edu.tw
- http://bvcoend.ac.in
- http://www.irm.umn.edu
- https://en.wikipedia.org
- http://ecoursesonline.iasri.res.in

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SEMESTER- VIII

External: 25
Internal: 25
Total: 50

BSCBED852: PRACTICAL(PHYSICS)

Course Objective:

The objective of this course is to impart the knowledge to the students about the Experiments so that they correlate their theory course with experimental observations.

Course Content:

(A minimum of TEN experiments to be selected from the following)

1. Measurement of susceptibility of a paramagnetic solution (Quinck`s Tube Method)
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. Determination of Hall coefficient in semiconductors.
5. Determination of Curie temperature– ferromagnet.
6. To determine the complex dielectric constant and plasma frequency of metal usingSurface Plasmon resonance (SPR).
7. To determine the refractive index of a dielectric layer using SPR.
8. To study the PE Hysteresis loop of a Ferroelectric Crystal.
9. To draw the B- H curve of iron using a Solenoid and determine the energy loss fromHysteresis.
10. To measure the resistivity of a semiconductor (Ge) crystal with temperature by fourprobemethod (from room temperature to 150o C) and to determine its band gap.
11. Franck-Hertz experiment.
12. Powder XRD pattern of KCl.
13. Powder XRD pattern of NaCl.
14. Powder XRD pattern of CaCl2.
15. Solar cell experiment.

Course Outcomes:

Students completing this course will be able to:

CO1:Determine hall coefficient
CO2:Measurement of Magnetic susceptibility
CO3:Calculate refractive index of a dielectric layer
CO4 :Plot B- H curve of iron

References:

1. Solid State Electronic Devices by B.G. Streetman.

2. Integrated Electronics by J. Millman and C.C. Halkias.
3. Electronics Devices and Circuit Theory by R.L. Boylested and L. Nashelysky.
4. Electronic Devices and Circuits by Balbir Kumar and S. B. Jain.

Website Sources:

- https://physics.iitm.ac.in
- http://davjalandhar.com
- https://www.electronics-tutorials.ws
- https://www.osapublishing.org

Note: Latest editions of all the suggested readings must be used

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External: 70
Internal: 30
Total: 100

BSCBED833: COMPLEX ANALYSIS& NUMERICAL ANALYSIS

Course Objectives:

The main aims of this course are to study Cauchy integral formula, local properties of analytic functions, general form of Cauchy's theorem and evaluation of definite integrals and harmonic functions. Numerical analysis in orderto develop the skillsand to solve the problems arising in various fields of applicationsuch as in science, engineering and economics etc. study of system of linear & non-linear equations, numerical initial and boundary value problems of ordinary differential equations.

Course Content:

Unit I

Functions of a Complex Variable, Limits, Continuous Functions, Differentiability, TheCauchy-Riemann Equations, Analytic Functions, Harmonic Functions, Conformal Mappings.Elementary Transformations, Bilinear Transformations, Cross ratio, Fixed Points of BilinearTransformationsfor skill development.

Unit II

Complex Integration: Introduction, Definite Integral, Cauchy's Theorem, Cauchy's integralFormula, Higher Derivatives. Power Series**:** Introduction, Sequences and Series, Sequencesand Series of Functions, Power Series, Elementary Functionsfor development of skills and knowledge.

Unit III

Numerical Methods: Numerical Solutions of Algebraic and Transcendental equations,Bisection Method, Method of false position, Iteration method, Newton-Raphson method.Finite differences, Forward and Backward differences, Weierstrass theorem, Interpolation,Newton-Gregory forward and backward interpolation formulae, divided differences,Lagrange's interpolation formula.

Unit IV

Numerical Differentiation: Finding first and second derivatives using interpolation formulae,Difference equations.Integration: General quadrature formula, Trapezoidal Rule, Simpson's 1/3 rule, Simpson's 3/8rule, Weddle's rule, Newton-Cotes quadrature formula, Gauss quadratureto develop the employability and entrepreneurship skills.

Course Outcomes:

This course will enable the students to:

CO1: Analyze Analytic functions and exponential functions.Apply Cauchy's theorem for disk and the Integral formulafor skill development.

CO2:Understand Local properties of Analytic functions.Study Residue theorem and the argument principlefor skill development.
CO3:Differentiate the Taylor's series and Laurent series.Identity and analyze different types of errors encountered in numerical computing.
CO4:Apply the knowledge of Numerical Mathematics to solve problems efficiently arising in science, engineering and economics etcfor skill development.
CO5:Utilize the tools of the Numerical Mathematics in order to formulate the real-world problems from the view point of numerical mathematicsfor skill development.

PO-CO-Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	1	2	2	1	2	3
CO2	3	2	2	3	1	2	3	2
CO3	3	3	3	3	1	2	1	2
CO4	2	3	2	1	1	2	2	3
CO5	1	3	1	2	1	2	1	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	3	1	1
CO3	3	1	1
CO4	3	1	1
CO5	3	2	1

References:

1. An Introduction to the Theory of Functions of a Complex Variable by Copson, Oxford.
2. Complex Analysis by Ahlfors, McGraw Hill International Edition.
3. Complex Analysis by Serge Lang, Springer Verlag.
4. Foundations of Complex Analysis by Ponnuswamy, Narosa Publishing House.
5. Introduction to the Theory of Functions of a Complex Variable by Palka, SpringerVerlag.
6. Theory of Functions of a Complex Variable by Shanthinarayan, S. Chand and Co. Ltd.

Website Sources:

- www.pdfdrive.com

- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

Note: Latest editions of all the suggested readings must be used

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SEMESTER- VIII

External: 70
Internal: 30
Total: 100

BSCBED834: BIOCHEMISTRY, MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Course Objectives:

The objective of the course is to development of knowledge and skills about the core biological phenomena at the molecular level and to comprehend the fundamental principles of chemistry that govern complex biological systems.

Course Content:

Unit I Biochemistry – Ifor development of skills

a) **Carbohydrates** – Classification, chemical structures of mono, oligo and polysaccharides; carbohydrate metabolism – Glycolysis, TCA cycle, electron transport system.
b) **Proteins** – Classification and structural properties; Amino acids – Amino acid metabolism, transamination, decarboxylation
c) **Lipids** – Classification and properties; Lipid metabolism – oxidative pathway of saturated and unsaturated fatty acids

Unit II Biochemistry – II

a) **Enzymology** – Nature of enzymes, nomenclature and classification, mechanism of enzyme action – lock and key hypothesis, induce fit hypothesis; regulation of enzyme action and factors affecting enzyme action, Coenzymes and inhibitors.
b) **Vitamins and minerals** – Role of vitamin and minerals in normal health
c) **Nucleic acids:** Discovery, DNA- structure, forms, denaturation, bacterial, plasmid, plastid and mitochondrial DNAfor skill development.

Unit III Molecular Biology – I

a) RNA- structure, types (rRNA, mRNA, tRNA), and functions.
b) Replication of DNA in prokaryotes.
c) **Gene expression:** Central dogma; Transcription in prokaryotes; Genetic code; Translation in prokaryotes.

Unit IV Molecular Biology – II and Biotechnology

a) Regulation of gene expression in prokaryotes – lac operons
b) **Genetic engineering:** History, restriction endonucleases, ligases, vectors (pBR322, TDNA), cDNA library, cloning, PCR, bioinformatics

c) **Biotechnology:** Transgenic animals (giant mouse, transgenic sheep), monoclonal antibodies, gene therapy. Human genome project.

Course Outcomes:

After completion of the course, students will be able to develop their skills and knowledge.

CO1:Gain knowledge and skill in the fundamentals of biochemical sciences, interactions and interdependence of physiological and biochemical processes.

CO2:Get exposed to various processes used in industries.

CO3:Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleic acids,

CO4: Carbohydrates; and their role in metabolic pathways along with their regulation.

PO-CO-Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	3	1	2	2	2	1
CO2	3	1	1	3	1	2	2	2
CO3	3	2	3	2	3	3	1	2
CO4	2	3	3	2	3	3	2	3
CO5	1	1	1	2	2	3	1	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	2	1
CO2	3	1	1
CO3	3	2	2
CO4	3	1	1
CO5	3	1	1

References:

1. Principles of Biochemistry by Lehninger AB (CBS Publishers and Distributors, NewDelhi.
2. Animal Physiology and Biochemistry by K.V. Sastry – (Rastogi Publications, 2008).
3. Cell and Molecular Biology: Concepts and Experiments by Gerald Karp.
4. Molecular Biology of the Cell by Bruce Alberts.
5. Molecular Cell Biology by Harvey Lodish, David Baltimore and Arnold Berk.
6. Biotechnology: Applying the Genetic Revolution by David P. Clark BA, 2008

7. Biotechnology by V. Kumaresan (Saras Publication).

Website Sources:

- CECGurukul (www.cec.nic.in)
- https://www.youtube.com/user/cecedusat/featured.
- National Institute of Science Communication and Information Resources (NISCAIR) (http://www.niscair.res.in/) and National Science Digital Library (NSDL) (www.nsdl.niscair.res.in).
- National Digital Library of India (NDL India; https://ndl.iitkgp.ac.in/).

IFTM UNIVERSITY, MORADABAD
DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VIII

External: 25
Internal: 25
Total: 50

BSCBED853: PRACTICAL (ZOOLOGY)

Course Objectives:

The objective of the course is to make the study relevant, interesting, encouraging to the students to join the industry or to prepare them for higher studies including research. The new and updated syllabus is based on a basic and applied approach to ensure that students develop problem solving skills, laboratory skills, chemistry communication skills, team skills as well as ethics.

Course Content:

1. Effect of temperature on the salivary amylase enzyme activity.
2. Effect of pH on the salivary amylase enzyme activity.
3. Effect of substrate concentration on the salivary amylase enzyme activity.
4. Detection of various enzymes in the digestive tract of cockroach.
5. Separation and analysis of amino acids in body fluids and food using paperchromatography.
6. Qualitative and quantitative estimation of carbohydrates, proteins and lipids infood/animal tissues.
7. Demonstration of separation of proteins/enzymes with electrophoresis.

Course Outcomes:

Upon completion of the course, students will be able to

CO1:Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleic acids, and carbohydrates; and their role in metabolic pathways along with their regulation.

CO2:Know about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments, and analyze the resulting data.

CO3:Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals.

References:

1. A manual of practical zoology: biodiversity, cell biology, genetics & developmental biology part 1 (M.M. Trigunayat).
2. Advanced lab practices in biochemistry & molecular biology (Swati Agarwal &Suphiya Khan)

Website Sources:

- https://oer.galileo.usg.edu

- http://www.biologycorner.com

Note: Latest editions of all the suggested readings must be used.

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VIII

External: 70
Internal: 30
Total: 100

BSCBED835: MOLECULAR BIOLOGY, BIOCHEMISTRY & BIOTECHNOLOGY

CourseObjectives

The objective of this course is to gain the understanding of students skills and knowledge about Nucleic acids, their replication, gene structure and regulation in prokaryotes, operon concept-lac and tryptophan operon, genetic code.This course also familiarize the students with enzymes, mechanism of enzymes, synthesis and biological role of ATP, Chemistry of Nucleic acid, general account of vitamins, biomolecules and their significance as well as nitrogen metabolism.This course aims to introduce to the students with basics concepts of biotechnology and its application in different fields

Course Content:

Unit I

Nucleizacids DNA and RNA; (i) DNA: types,characteristics, structural properties and functions. Satellite and repetitive DNA,mitochondrial and plastid DNA, plasmid, replication of DNA inprokaryotes and eukaryotes. (ii) RNA: Types, structure, characteristics, structural propertiesand functions, Role of RNAs in protein synthesis.Gene structure and regulation in prokaryotes, operon concept – lac and tryptophan operon,genetic codefor development of skills and knowledge.

Unit II

Nitrogen Metabolism: Forms of nitrogen, cellular conversion of nitrates to ammonium ions,assimilation of NH+4 ions, biological nitrogen fixation, amino acids – nature, classification, structures.Proteins – classification, structure – primary, secondary, tertiary and quaternary, transcription, m-RNA processing, translation. Inhibitors of protein synthesis.

Unit III

Carbohydrates: Introduction, classification, chemical structures of mono, oligo and polysaccharides for development of skills and employability.

Lipids: Introduction, classification, chemical structures, saturated and unsaturated fatty acids,Enzymology: Nature, nomenclature and classification, mechanism of enzymeaction, lock and key hypothesis, induce-fit hypothesis, regulation of enzyme action, inhibitors,prosthetic groups and coenzymes, factors affecting enzyme action.

Unit IV Biotechnology and Bioinformatics

a) Tools and techniques, cloning vectors, brief account of genomics and c-DNA library, interferons, transposable elements, PCR, bio-informaticsfor development of skills and employability.
b) Applications of Biotechnology – functional definition and applications, brief account of DNA finger printing, Agrobacterium – mediated gene transfer, transgenic plants.
c) Brief account of recent advances in Plant bio-technology; products of bio technology
d) Brief account of Bioinformatics – genomics, proteomics.

Course Outcomes:

CO1:Nucleic acid as genetic material, types of DNA, DNA replication and enzymes involved in DNA replication.

CO2:Understand the structure and general features of enzymes, concept of enzyme activity and enzyme inhibition.Have the knowledge of DNA chemical constituents, and its replication for development of skills and entrepreneurship.

CO3:Understand the structure of biomolecules like carbohydrates, proteins, lipids and vitamins.

CO4:Understand nitrogen metabolism in plants.Describe bio-catalysis, pathway engineering, bioprocess control and downstream processing.

CO5: Demonstrate their ability to reason both inductively and deductively with experimental information and datafor development of skills and employability.Explain the theory and practice of recombinant DNA technology.

PO-CO-Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	1	2	3	2	1	1	3
CO2	3	2	1	2	2	2	3	2
CO3	2	3	1	2	1	1	3	2
CO4	1	2	2	3	2	2	2	3
CO5	3	2	2	1	1	3	2	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 where ever required)
(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

	Skill Development	Employability.	Entrepreneurship Development
CO1	3	2	1
CO2	3	1	2
CO3	3	1	1
CO4	3	2	1
CO5	3	2	1

References:

1. Alberts, B., D.Bray, J.Lewis, M.Raff, K.Roberts and I.O.Watson, 1999, Molecular Biology of Cell, Garland Publishing Co., Inc., New York.
2. Jain.J.L. 1994, Fundamentals of Biochemistry, Sultanchand& Co., New Delhi.

3. Lea, P.J. and R.C.Leegood, 1999, Plant Biochemistry and Molecular Biology, John Wiley & Sons, England.
4. Lehninger, A.B., Principles of Biochemistry, CBS Publishers and Distributors, New Delhi.
5. Lodish, H., A.Berk, S.L.Zipursky, P.Matsudaiva, D. Baltimore, and J.Darnell, 2000.
6. Malacinski, G.M., 2005, Essentials of Microbiology (4th Ed.)., Narosa Publishing House, New Delhi.
7. Molecular Cell biology, W.H. Freeman & Co., New York.
8. Old, R.W. and S.B.Primrose, 1989, Principles of Gene Manipulation, Blackwell Scientific Publication, Oxford, UK.
9. Srivastava, H.S.2005, Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications, Meerut.

Website Sources:

- www.pdfdrive.com/botany-books.html
- www.pdf.com
- *en.wikipedia.org*
- *onlineecourses.nptel.ac.in*
- www.yourarticlelibrary.com
- www.freebookcentre.net
- https://gurukpo.com

Note: Latest editions of all the suggested readings must be used.

IFTM UNIVERSITY, MORADABAD

DEPARTMENT OF EDUCATION
B.Sc.-B.Ed. Integrated Programme
SEMESTER- VIII

External: 25
Internal: 25
Total: 50

BSCBED854: PRACTICAL (BOTANY)

Course Objective:

The main objective of this subject is to share the knowledge to the students about the experiments. The students will get a better understanding of the concept studied by them in theory course and correlate with experimental observations.

Course Content:

1. Isolation of DNA from coconut endosperm.
2. Effect of pH and temperature on activity of amylase in germinating seeds.
3. Study of catalase and peroxidase enzyme activity as influenced by pH and temperature.
4. Separation of amino acids by paper chromatography.
5. Study of root nodules in leguminous plants.
6. To test for the presence of carbohydrates, proteins and lipids.

Course Outcomes:

The students completing this course will able to know:

CO1:How DNA is isolated from coconut endosperm?

CO2:The effects of pH and temperature on amylase, catalase and peroxidase activity.

CO3:How to separate amino acids by paper chromatography?

CO4: Qualitative and quantitative test for the presence of carbohydrates, proteins and lipids for skill development.

References:

1. A text Book of Practical Botany 2 by Bendre and Kumar.
2. Practical Botany II by O.P. Sharma.

Website Sources:

- https://oer.galileo.usg.edu
- http://www.biologycorner.com