आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

IFTM University, Moradabad, Uttar Pradesh

NAAC ACCREDITED

IFTM UNIVERSITY
N.H.-24, Lodhipur Rajput, Delhi Road, Moradabad, Uttar Pradesh-244001

www.iftmuniversity.ac.in

Study&Evaluation Scheme of
Diploma (Civil Engineering)

Programme:	**Diploma (Civil Engineering)**
Course Level:	**Diploma**
Duration:	**Three Years (Six Semesters) Full Time**
Medium of Instruction:	**English**
Minimum Required Attendance:	**75%**
Maximum Credits:	**158**

Programme Outcomes (POs):

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Communicate effectively with a range of audiences.
4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions.
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgment to draw conclusion.

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DEPARTMENT OF CIVIL ENGINEERING
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Diploma (Civil Engineering)

YEAR I, SEMESTER-I

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total L	Credits T
						Mid Term Exam			External Exam		
			L	T	P	CT	AS +AT	Total			
THEORY											
1.	DPH-101	Elementary Physics-I	3	1	0	20	10	30	70	100	4
2.	DMA-101	Elementary Mathematics –I	3	1	0	20	10	30	70	100	4
3.	DCH-101	Elementary Chemistry-I	3	1	0	20	10	30	70	100	4
4.	DME-101	Elementary Engineering Mechanics	3	1	0	20	10	30	70	100	4
5.	DME-102 / **DEE- 101**	Workshop Technology /**Basic Electrical & Electronics Engineering**	3	1	0	20	10	30	70	100	4
6.	FEC-101/ **DCS-101**	Fundamental English communication/**Computer fundamental & programming in C**	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	DME-151/ **DCS-151**	Engineering Drawing Lab /**Computer Programming Lab**	0	0	2	-	-	30	70	100	1
8.	DPH-151	Physics-I Lab	0	0	2	-	-	30	70	100	1
9.	DCH-151	Chemistry-I Lab	0	0	2	-	-	30	70	100	1
10.	DME-152 / **DEE- 151**	Workshop Lab /**Basic Electrical & Electronics Engineering Lab**	0	0	2	-	-	30	70	100	1
11.	DGP-101	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

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YEAR I, SEMESTER-II

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total L	Credits T
						Mid Term Exam			External Exam		
			L	T	P	CT	AS +AT	Total			
THEORY											
1.	DPH-201	Elementary Physics-II	3	1	0	20	10	30	70	100	4
2.	DMA-201	Elementary Mathematics –II	3	1	0	20	10	30	70	100	4
3.	DCH-201	Elementary Chemistry-II	3	1	0	20	10	30	70	100	4
4.	DME-201	Elementary Mechanical Engg.	3	1	0	20	10	30	70	100	4
5.	DEE-201 / **DME- 202**	Basic Electrical & Electronics Engineering /**Workshop Technology**	3	1	0	20	10	30	70	100	4
6.	**FEC-201/** DCS-201	**Fundamental English communication** /Computer fundamental & programming in C	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	DPH-251	Physics-II Lab	0	0	2	-	-	30	70	100	1
8.	DEE-251 /**DME- 252**	Basic Electrical & Electronics Engineering Lab / **Workshop Lab**	0	0	2	-	-	30	70	100	1
9.	DCS-251/ **DME-251**	Computer Programming Lab /**Engineering Drawing Lab**	0	0	2	-	-	30	70	100	1
10.	DCH-251	Chemistry-II Lab	0	0	2	-	-	30	70	100	1
11.	DGP-201	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1200**	**29**

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YEAR II, SEMESTER-III

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
						Internal Exam			External Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	DCE-401	Basic Geotechnical Engineering	3	1	0	20	10	30	70	100	4
2.	DCE-402	Basic Concrete Technology	3	1	0	20	10	30	70	100	4
3.	DCE-403	Surveying Practice-II	3	1	0	20	10	30	70	100	4
4.	DCE-404	Introductory Fluid Mechanics	3	1	0	20	10	30	70	100	4
5.	DCE-405	Basic Structural Analysis	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
6.	DCE-451	Basic Geotechnical Engineering Lab	0	0	2	-	-	30	70	100	1
7.	DCE-452	Concrete Technology Lab	0	0	2	-	-	30	70	100	1
8.	DCE-453	Surveying Practice-II Lab	0	0	2	-	-	30	70	100	1
9.	DCE-454	Fluid Mechanics Lab	0	0	2	-	-	30	70	100	1
10.	DGP-401	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**15**	**05**	**08**	**-**	**-**	**-**	**-**	**1000**	**25**

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Diploma (Civil Engineering)

YEAR II, SEMESTER-IV

S.N.	Course Code	Course Name	Periods			Internal Exam				Course Total	Credits
			L	T	P	Mid Sem Exam	AS+AT	Total	External Exam		
THEORY											
1	DME-301	Materials Science & Engineering	3	1	0	20	10	30	70	100	4
2	DCE-302	Introductory Strength of Materials	3	1	0	20	10	30	70	100	4
3	DCE-303	Public Health Engineering	3	1	0	20	10	30	70	100	4
4	DCE-304	Surveying Practice-1	3	1	0	20	10	30	70	100	4
5	DCE-305	Building Construction & Maintenance	3	1	0	20	10	30	70	100	4
PRACTICAL / PROJECT											
6	DME-351	Materials Science Lab	0	0	2	-	-	30	70	100	1
7	DCE-353	Public Health Engineering Lab	0	0	2	-	-	30	70	100	1
8	DCE-354	Surveying Practice-I Lab	0	0	2	-	-	30	70	100	1
9	DCE-355	Building Material Lab	0	0	2	-	-	30	70	100	1
10	DGP-301	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**15**	**05**	**08**	**-**	**-**	**-**	**-**	**1000**	**25**

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YEAR III, SEMESTER-V

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
						Internal Exam			External Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	DCE-501	Basic Transportation Engineering	3	1	0	20	10	30	70	100	4
2.	DCE-502	Construction Management & Entrepreneurship Development	3	1	0	20	10	30	70	100	4
3.	DCE-503	Design of Concrete Structures	3	1	0	20	10	30	70	100	4
4.	DCE-504	Estimation & Costing	3	1	0	20	10	30	70	100	4
5.	DCE-505	Basic Earthquake Engineering	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
6.	DCE-551	Transportation Engineering Lab	0	0	2	-	-	30	70	100	1
7.	DCE-552	CAD Lab-I	0	0	2	-	-	30	70	100	1
8.	DCE-553	Field Exposure	0	0	2	-	-	30	70	100	1
9.	DCE-554	Seminar-I	0	0	2	-	-	100	-	100	1
10.	DGP-501	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**15**	**05**	**08**	**-**	**-**	**-**	**-**	**1000**	**25**

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YEAR III, SEMESTER-VI

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
						Internal Exam			External Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	DCE-601	Engineering Geology	3	1	0	20	10	30	70	100	4
2.	DCE-602	Irrigation Engineering	3	1	0	20	10	30	70	100	4
3.	DCE-603	Environmental Pollution Studies	3	1	0	20	10	30	70	100	4
4.	DCE-604	Introduction to Bridge Engineering	3	1	0	20	10	30	70	100	4
5.	DCE-605	Design of Steel Structures	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	DCE-651	Engineering Geology Lab	0	0	2	-	-	30	70	100	1
8.	DCE-652	CAD Lab-II	0	0	2	-	-	30	70	100	1
9.	DCE-653	Project	0	0	2	-	-	30	70	100	1
10.	DCE-654	Civil Engineering Drawing Lab	0	0	2	-	-	30	70	100	1
11.	DGP-601	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**15**	**05**	**08**	**-**	**-**	**-**	**-**	**1000**	**25**

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Diploma (Civil Engineering)

DPH-101: ELEMENTARY PHYSICS-I

Objective: This aim of this course is to impart knowledge in basic concepts of physics like unit, dimension, work, energy and power etc. and their applications

UNIT I **(8 Sessions)**

Unit and Dimensions

Physical quantities, Fundamental and derived units, Systems of unit (CGS, MKS and SI units), Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, coefficient of viscosity and strain) , Dimensional equations and their uses with examples, Limitations of dimensional analysis.

UNIT II **(10 Sessions)**

Force and Motion

Scalar and vector quantities - examples, addition and multiplication of vectors, scalar product and vector product of vectors, Force, resolution and composition of forces – resultant, friction, law of friction and type of friction, Newton's Laws of motion – concept of momentum, determination of force equation from Newton's second law of motion, Newton's third law of motion Conservation of momentum, impulse and impulsive forces, simple numerical problems, Circular motion (Definition), Relation between linear and angular velocity and linear acceleration and angular acceleration , Centripetal force (derivation) and centrifugal force Banking of roads, Definition of torque ,Planetary Motion, Newton's law of gravitation, Kepler's law of planetary motion, Escape velocity (derivation)

UNIT III **(8 Sessions)**

Work, Power and Energy

Work: definition and its units, Work done against friction in moving an object on horizontal and inclined plane (incorporating frictional forces),

Power: definitions and its units, calculation of power in simple cases,

Energy: Definitions and its units: Types: Kinetic energy and Potential energy, with examples and their derivation.

UNIT IV **(8 Sessions)**

Temperature and its measurement

Difference between heat and temperature on the basis of K.E. of Molecules, Principles of measurement of temperature and different scales of temperature, Transfer of Heat, Modes of transfer of heat (conduction, convection and radiation with examples), Coefficient of thermal conductivity, Properties of heat radiation. Prevost's theory of heat exchange, Laws of black body radiations: Stefan's law, Kirchhoff's law, Wien's law.

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UNIT V **(10 Sessions)**

Properties of Matter

Elasticity, stress and strain, Different types of modulus of elasticity, Surface tension- its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension, Fluid motion, stream line and turbulent flow, Viscosity and coefficient of viscosity.

Course Outcomes:

Students completing this course will be able to:

- Identify different systems of units and convert units from one system to another as well as conversant with practical units.
- Understand equations of motion and their applications.
- Differentiate between work, energy and power
- Explain Mode of heat transfer and black body radiation.
- Define stress, strain, elasticity, surface tension and their applications.

Suggested Readings:

1. Concept of Physics, Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics: Eagle Prkashan, Jullandhar

Website Sources:

- https://thefactfactor.com
- https://i1.dainikbhaskar.com
- https://hplgit.github.io

UNIVERSITY POLYTECHNIC
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IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DPH-151: PHYSICS LAB - I

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

LIST OF EXPERIMENTS: **(20 Sessions)**

1. To find the surface tension of a liquid by Jaeger's method.
2. To find volume of solid cylinder and hollow cylinder using a Vernier caliper.
3. To determine the atmospheric pressure at a place using Fortin's Barometer.
4. To determine the thickness of glass strip and radius of curvature of a concave surface using a speedometer.
5. To determine the time period of simple pendulum and plot a graph between l & t
6. To determine the acceleration due to gravity with the help of a Bar Pendulum.
7. To determine the coefficient of viscosity of water with the help of Poiseuille method.
8. Verify parallelogram Law of forces.
9. To determine the modulus of rigidity (η) of the material of wire with the help of torsional pendulum using the inertia table
10. To find the thickness of wire using a screw gauge.

Course Outcomes:

Students completing this course will be able to:

- Use the different measuring devices and meters to record the data with precision
- Measurement of surface tension, volume and atmospheric pressure.
- Determine coefficient of viscosity and modulus of rigidity
- Measurement of thickness of wire.

Suggested Readings:

1. Concept of Physics, Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics: Eagle Parkashan, Jullandhar

Website sources:

- http://dspace.wbpublibnet.gov.in
- https://www.scribd.com
- http://www.brainkart.com
- https://dkpandey.weebly.com
- https://images.topperlearning.com

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Diploma (Civil Engineering)

DPH-201: ELEMENTARY PHYSICS-II

Objective: The objective of this course is to provide an understanding of optics, electro statistics and semiconductors etc.

UNIT I **(8 Sessions)**

Waves and Vibrations: Introduction, Types of wave motion with examples, Relation between velocity of wave, frequency and wave length of a wave ($v = \eta\lambda$) , Simple harmonic motion: definition, expression for displacement, Velocity, acceleration, time period, frequency in S.H.M., Vibration of spring mass system, , Free, forced and resonant vibrations with examples.

UNIT II **(8 Sessions)**

Optics :Concept of mirrors, lenses, reflection & refraction of light, refractive index, lens formula (no derivation), real and virtual image, magnification, Power of lens, Simple and compound microscope, magnifying power and its calculation (in each case) , Total internal reflection

UNIT III **(10 Sessions)**

Electrostatics: Coulomb's law, Gauss's Law, Electric field intensity and electric potential, Electric field of point charge, charged sphere, Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Dielectric and dielectric constant.

UNIT IV **(10 Sessions)**

Current Electricity :Ohm's law, Resistance of a conductor, specific resistance, Series and Parallel, Combination of resistors, effect of temperature on resistance, Kirchhoff's laws, Wheatstone bridge principle and its applications, Heating effect of current and concept of electric power.

UNIT V **(8 Sessions)**

Semi-Conductor Physics: Energy bands, Intrinsic and Extrinsic semi-conductor, p-n junction diode and its characteristics, Diode as rectifier-half wave and full wave rectifier.

Course Outcomes:

Students completing this course will be able to:

- Differentiate between wave and vibrations
- Understand mirror, lens, reflection and refraction
- Understand Simple microscope and compound microscope
- Coulomb's law, Gauss Law and their applications
- Apply Ohms law to solve problems.
- Understand semiconductors and diodes.

Suggested Readings:

1. Concept of Physics Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics: Eagle Parkashan, Jullandhar

Website sources:

- https://courses.lumenlearning.com
- https://en.wikipedia.org
- https://cnx.org
- http://www.sakshieducation.com

UNIVERSITY POLYTECHNIC
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Diploma (Civil Engineering)

DPH-251: Physics Lab-II

Objective: This course aim is to give exposure to the students about the experiments so that students will get a better understanding of the concepts studied by them in the theory course and can correlate with experimental observations.

LIST OF EXPERIMENTS: **(20 Sessions)**

1. To determine and verify the time period of cantilever by drawing graph between load and depression
2. To determine the magnifying power of a compound microscope
3. To determine the magnifying power of an astronomical telescope
4. To verify Ohm's law
5. To verify law of resistances in series
6. To verify law of resistances in parallel
7. To convert a galvanometer into an ammeter of given range
8. To convert a galvanometer into a voltmeter of a given range

Course Outcomes:

Students completing this course will be able to:

- Evaluate time period of cantilever
- Determine magnifying power
- Verify law of resistances
- Apply the mathematical concepts/equations to obtain quantitative results.
- Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

Suggested Readings:

1. Concept of Physics Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics: Eagle Parkashan, Jullandhar

Website sources:

- https://www.learncbse.in
- http://notesforfree.com
- https://www.cmi.ac.in
- http://amrita.olabs.edu.in
- http://sisphysics.weebly.com

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DCH -101: ELEMENTARY CHEMISTRY-I

Objectives: To emphasize the relevance of fundamentals and applications of chemistry for diploma holders and student will learn appropriate combinations of old and new emerging concepts. Also, to bring potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT I **(08 Sessions)**

Structure Of Atom: Basic concepts of atomic structure, Matter wave concept, Schrodinger wave equation (excluding derivation) Quantum number, Heisenberg's Uncertainty Principle, Shapes of orbitals.

Chemical Bonding: Basic concepts, Hydrogen bonding, Valence bond theory, Hybridization, VSEPR theory, Molecular orbital theory as applied to diatomic homo nuclear molecules of first and second period elements, Co-ordination bond.

UNIT II **(08 Sessions)**

Periodic Classification of Elements: Classification of elements (s, p, d and f block elements), Modern Periodic law, Periodic properties: Ionization energy electro negativity, Electron affinity,

UNIT III **(08 Sessions)**

Electro Chemistry: Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases: Bronsted, Arrhenius and Lewis theory. pH. Buffer solutions, Indicators, Solubility product, Common ion effect with their applications, Redox reactions, Electrode potential (Nernst Equation), Electro-chemical cells (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electro chemical series and its applications., Laclanche's or dry cell, Acid storage cell (Lead accumulator) and Alkali stroge cell (Edison accumulator), Solar cell (Photovoltaic cell), Numerical problems based on topics.

UNIT IV **(08 Sessions)**

Chemical Kinetics: Introduction, rate of reaction, rate constant order and molecularity of reaction. Activation energy, zero order First order and Second order (when initial concentration of both the reactants are same) reactions.

Catalysis: Definition, Characteristics of catalytic reactions, Catalytic promoters and poison, Autocatalysis and Negative catalysis, Theory of catalysis, Application.

UNIT V **(08 Sessions)**

Solid State and Colloids

Solid State: Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection

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Colloids: Colloids and its types, Different system of colloids, Dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electro-dialysis. Properties of colloidal solution with special reference to adsorption, Brownian Movement, Tyndal effect, Electrophoresis and coagulation. Gold number, Application of colloids.

Course Outcome:

- Students will able to understand and relate electrochemistry and corrosion.
- They will analyze the basic knowledge of various types of colloids, their properties and Industrial Applications
- Can apply the science for understanding the solid state and its various application in making semiconductors.

Suggested Readings:

1. Liquid Crystals and Plastic Crystals, vol.-I, edited by G.W. Gray and P.A. Winsor, Ellis Harwood Series in Physical Chemistry, New York.
2. Corrosion Engineering by M.G. Fontana McGraw Hill Publications
3. Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
4. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.

Website Sources:

- http://www.commonchemistry.org/

UNIVERSITY POLYTECHNIC
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IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCH -151: CHEMISTRY- LAB I

Objectives: Practical implementation of fundamental concepts of qualitative and quantitative analysis. Student willgain the knowledge on existing future upcoming devices, materials and methodology used in chemistry practical. They will rely on elementary treatment and qualitative analysis. These practicals will provide an overview of quantitative analysis.

LIST OF EXPERIMENTS: **(20 Sessions)**

1. To analyses inorganic mixture for two acid and basic radicals from following radicals
   a) Basic Radicals:
   NH_4^+, Pb^{++}, Cu^{++}, Bi^{++}+, Cd^{++}, As^{+++}, Sb^{+++}, Sn^{++}, Al^{+++}, Fe^{+++}, Cr^{+++},
   Mn^{++}, Zn^{++}, Co^{++}, Ni^{++}, Ba^{++}, Sr^{++}, Ca^{++}, Mg^{++}
   b) Acid Radicals:
   CO_3^{--}, S^{--}, SO_3^{--}, CH_3COO^-, NO_2^-, NO_3^- , Cl^-, Br^- , I^- , SO_4^{--}
2. To determine the percentage of available Chlorine in the supplied sample of bleaching powder.
3. To determine the total hardness of water sample in terms of $CaCO_3$ by EDTA titration method using Eriochroma black-T indicator.
4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalium as indicator.
5. To determine the Chloride content in supplied water sample by using Mohr's methods
6. Determination of temporary hardness of water sample by O- Hener's method.

Course Outcome:

- Students are able to analyses different anions and cations .
- Ability to know the quantitative analysis .
- Ability to know the strength of an acid by using alkali.

Suggested Readings:

1. Applied Chemistry by R. S. Katiyar& J.P. Chaudhary Publication B.B.P. & Co. Meerut
2. March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure Smith, Michael B./March, Jerry, John Willey & sons, 6th Edition, 2007.
3. Elements of Physical Chemistry, Glasstonne, Samuel B. ELBS, 2005.
4. Organic Chemistry, Finar, I.L.: Addison – Wesley Longman, Limited, 2004.
5. Principles of Physical Chemistry, by Puri B.R., Sharma L.R., S. Nagin& Company, Delhi

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

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Diploma (Civil Engineering)

DCH -201: ELEMENTARY CHEMISTRY-II

Objectives: To emphasize the relevance of fundamentals and applications of chemistry for diploma holders and student will learn appropriate combinations of old and new emerging concepts. Also, to bring potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT I **(08 Sessions)**

Lubricants:

Definition, classification, Necessity and various kinds of lubricants. Function and mechanism of action of lubricants with examples. Properties of lubricants, Importance of additive compounds in lubricants, Synthetic lubricants and cutting fluids.

UNIT II **(08 Sessions)**

Fuels and Environmental Pollution:

Definition of fuel, its classification and their composition, Knocking, Anti-knocking agents, Octane number and Cetane number. Cracking and its type, Gaseous Fuel - Water gas, Bio gas, LPG, CNG and solar energy.

Concept and various types of environmental pollution, air pollution and water pollution. General measures to control environmental pollution. Depletion of Ozone layer, Greenhouse effect, Acid rain, Smog formation.

UNIT III **(08 Sessions)**

Water Treatment and Corrosion:

Concept of hard and soft water, Hardness of water, Softening method (Only Ion exchange resin process). Disadvantages of hard water in different industries, Boiler feed water.

Corrosion- Concept of metallic corrosion, factors affecting the corrosion rate, Prevention of corrosion by various methods.

UNIT IV **(08 Sessions)**

Glass and Ceramics:

Concept of glass and its constituents, Classification and uses of different glass, Elementary idea of manufacturing process of glass.

UNIT V **(08 Sessions)**

Organic Chemistry:

Isomerism- Types of isomerism

1. Structural isomerism
2. Stereoisomerism (a) Geometrical (b) Optical

A. Electrophiles and nucleophiles

B. Reaction Intermediates

i. Free radical

ii. Carbocation
iii. Carbanion

Polymers:

1. Basic terms used in polymer chemistry and Polymerization.
2. Characteristics of Polymers and their classification

Course Outcome:

- Students will also be able to understand the chemistry of fuels and lubricants.
- Students will analyze the basic knowledge of various types of organic reactions and their applications
- Students will understand the preparation and properties of glass and ceramics.

Suggested Readings:

1. Liquid Crystals and Plastic Crystals, vol.-I, edited by G.W. Gray and P.A. Winsor, Ellis Harwood Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
2. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.

Website Sources:

- http://www.commonchemistry.org/
- https://www.technicalsymposium.com/

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCH -251: CHEMISTRY-II LAB

Objectives: Practical implementation of fundamental concepts of qualitative and quantitative analysis. Student willgain the knowledge on existing future upcoming devices, materials and methodology used in chemistry practical. They will rely on elementary treatment and qualitative analysis. These practical's will provide an overview of quantitative analysis.

LIST OF EXPERIMENTS: **(20 Sessions)**

1. Determination of pH of Common Substances.
2. Measurement of soil suspension pH (1:5 or 1:2).
3. Preparation of Soap.
4. Determination of the Strength of Ferrous Sulphate using Standard Ferrous Ammonium sulphate and Potassium Dichromate as Intermediate Solution.
5. Looking at Acid's Effects on Metals.
6. Paper Chromatography of dyes.
7. Determination of the Strength of Copper Sulphate Solution using a Standard Solution of sodium thiosulphate solution.
8. Extract synthetic coloring agents in food products and identify them by paper chromatography.
9. To determine the pH level of both city water and well water to determine which is more basic and which is more acidic
10. Determination of temporary and permanent hardness of water sample.

Course Outcome:

- Students are able to prepare the goods like soaps for cottage industry and self-employability.
- Ability to know the separation methods to separate different dyes.
- Ability to calculate the temporary and permanent hardness of different samples of water.

Suggested Readings:

1. Applied Chemistry by R. S. Katiyar& J.P. Chaudhary Publication B.B.P. & Co. Meerut
2. March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure Smith, Michael B./March, Jerry, John Willey & sons, 6th Edition, 2007.
3. Elements of Physical Chemistry, Glasstonne , Samuel B. ELBS, 2005.
4. Organic Chemistry, Finar, I.L.: Addision – Wesley Longman, Limited, 2004.
5. Principles of Physical Chemistry, by Puri B.R., Sharma L.R., S. Nagin & Company, Delhi

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

UNIVERSITY POLYTECHNIC
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IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DMA – 101: ELEMENTARY MATHEMATICS-I

Objective: - To understand basics and applications of algebra, determinants, vectors, trigonometry and complex numbers. The focus of these topics in field to impart their knowledge in particular area of engineering branches and Comprehensive knowledge of basic mathematics.

UNIT I **(12 Sessions)**

Series : AP and GP; Sum of n terms, Partial fractions, Exponential and Logarithmic series, Binomial theorem for positive, Negative and fractional index (without proof) Application of Binomial theorem, Permutation & combination.

UNIT II **(10 Sessions)**

Determinants: Elementary properties of determinants of order 2 and 3, Consistency and solution of system of algebraic equation by Cramer's rule, Matrices, Type of matrix, Properties (addition, subtraction, multiplication, adjoint, inverse) of matrix.

UNIT II **(10 Sessions)**

Vector algebra: Dot and Cross product, Scalar and vector triple product, Application to work done, Moment of a force.

UNIT IV **(10 Sessions)**

Trigonometry: Relation between sides and angles of a triangle, Statement of various formulae showing relationship between sides and angles of a triangle, trigonometrically equations, Inverse trigonometric function.

UNIT V **(10 Sessions)**

Complex numbers, Representation, Modulus and amplitude De-moiver's theorem and its application in solving algebraic equations, Mod, Function and its properties.

Course Outcomes:

The student is able to

- Students will be able to remember terminologies and formulae in algebra, determinants, vectors, trigonometry and complex numbers.
- Students will be able to understand and interpret the concepts of algebra, determinants, vectors, trigonometry and complex numbers.
- Students will be able to compare and analyse the methods in algebra, determinants, vectors, trigonometry and complex numbers.
- Students will be able to predict and evaluate the problems in algebra, determinants, vectors, trigonometry and complex numbers.

Suggested Readings:

1. R.D. Sharma: Mathematics (I& II-XI) [Dhanpat Rai Publication, Delhi.]

2. B.S. Grewal : Engg. Mathematics by [Khanna Publishers, New Delhi.]
3. H.R. Luthra : Applied Mathematics:[Bharat Bharti Prakash an & Co. Meerut]
4. Kailash Sinha : Applied Mathematics: [Nav Bharat Publication, Meerut]

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DMA – 201: ELEMENTARY MATHEMATICS-II

Objective: - The course is aimed to develop the basic Mathematical skills of diploma engineering students that are imperative for effective understanding of engineering subjects. To understand basics and applications of differential & integral Calculus and coordinate geometry.

UNIT I **(12 Sessions)**

DIFFERENTIAL CALCULUS-I: Functions, Limits, Continuity, Functions and their graphs, Range and domain, Elementary methods of finding limits (right and left), Elementary test for continuity and differentiability. Methods of finding derivative, Function of a function, Logarithmic differentiation, Differentiation of implicit functions.

UNIT II **(10 Sessions)**

Higher order derivatives, Leibnitz's theorem. Special functions (Exponential, Logarithmic, Hyperbolic, Inverse and circular function), Definition, Graphs, Range and Domain and Derivations of each of these functions.

UNIT II **(10 Sessions)**

Application - Finding Tangents, Normal, Points of maxima and minima, Increasing and Decreasing functions, sketching of some simple curves (without assumptions, question, not to be asked in the examination), Rate, Measure, Velocity, Acceleration, Errors and approximations.

UNIT IV **(10 Sessions)**

INTEGRAL CALCULUS-I: Methods of indefinite integration:- Integration by substitution, by partial fraction and by parts, Integration of special functions Meaning and properties of definite integrals, Evaluation of definite integrals.

UNIT V **(10 Sessions)**

CO-ORDINATE GEOMETRY: Standard form of curves and their simple properties-Parabola Ellipse, Hyperbola, Tangent and normal, Straight lines, Planes and Spheres in space-distance between two points in space, Direction cosines and direction ratios, Finding equation of a straight line and Shortest distance between two lines under different conditions equation of a plane, Relation between lines and Planes, Sphere.

Course Outcomes:

The student is able to

- Students will be able to remember terminologies and formulae differential, integral Calculus andCoordinate Geometry.
- Students will be able to understand and interpret the concepts of differential, integral, Calculus andCoordinate Geometry.

- Students will be able to compare and analyses the methods in differential, integral, Calculus andCoordinate Geometry.

- Students will be able to predict and evaluate the problems in differential, integral Calculus andCoordinate Geometry.

Suggested Readings:

1. R.D. Sharma: Mathematics (I& II-XI) [Dhanpat Rai Publication, Delhi.]
2. B.S. Grewal : Engg. Mathematics by [Khanna Publishers, New Delhi.]
3. H.R. Luthra : Applied Mathematics:[Bharat Bharti Prakash an & Co. Meerut]
4. Kailash Sinha : Applied Mathematics: [Nav Bharat Publication, Meerut]
5. NCERT (XI & XII)

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DME -101: ELEMENTARY ENGINEERING MECHANICS

Objective:

The primary objectives of elementary engineering mechanics course are to help the student develop this ability to visualize. Which is so
vital to problem formulation purpose of the study of elementary engineering mechanics. To develop the capacity to predict the effects of
force and motion while carrying out the creative design functions of engineering.

UNIT I **(8 sessions)**

Introduction: Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

UNIT II **(8 sessions)**

System of Forces: Concept of co-planer and non-co-planer forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of co-planer concurrent force system.

UNIT III **(8 sessions)**

Moment & couple: Concept of Varignon's theorem. Generalized theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.

UNIT IV **(8 sessions)**

General Condition of Equilibrium: General condition of equilibrium of a rigid body under the action of co-planer forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

Friction: Types of friction: statically, limiting and dynamical friction, statement of laws of sliding friction, Coefficient of friction, angle of friction; problems on equilibrium of a body resting on a rough inclined plane, simple problems on friction. Conditions of sliding and toppling.

UNIT V **(8 sessions)**

Stresses and strains: Concept of stress and strain. Concept of various types of stresses and strains. Definitions of tension, compression shear, bending, torsion. Concept of volumetric and lateral strains, Poisson's ratio. Changes in dimensions and volume of a bar under direct load (axial and

along all the three axes).Ultimate stress, working stress. Elasticity, Hook's law, load deformation diagram for mild steel and cast iron. Definition of modulus of elasticity, yield point, modulus of rigidity and bulk Modulus. Stresses and strains for homogeneous materials and composite sections.

Course Outcomes:

Students completing this course will be able to:

- Makes the students able to recognize different force systems, moments and couples.
- The ability to draw Free Body Diagram and label the reactions to it.
- Makes the students' abilities to apply equilibrium equations in statics.
- The ability to understand Newton's law in motion, and recognize different kinds of particle motions.
- The ability to find the moment and the couple.
- Acquire knowledge about stress and strain and how to find in different parts in different conditions.

Suggested Reading:

1. Engineering Mechanics by Irving H. Shames, Prentice-Hall
2. Mechanics of Solids by Abdul Mubeen, Pearson Education Asia.
3. Mechanics of Materials by E.P.Popov, Prentice Hall of India Private Limited.
4. Engineering Mechanics by R.K Bansal
5. Applied Mechanics by J.K.Kapoor, Bharat BhartiPrakashan.

Website Sources:

- www.onlinecourses.nptel.ac.in
- www.pdfdrive.com/engineering-mechanics-books.html
- https://en.wikibooks.org/wiki/Engineering_Mechanics
- http://library.iitj.ac.in/sp/subjects/guide.php?subject=ERL

UNIVERSITY POLYTECHNIC
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IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DME -102 / 202: WORKSHOP TECHNOLOGY

Objective:
The subject aims at imparting knowledge and skill components in the field of basic workshop technology. It deals with different hand and machine tools required for manufacturing simple metal components and articles. The primary objectives of this subject are to understand how different objects can be made from the given raw material by using different mechanical machines and tools.

UNIT I **(8 sessions)**
GENERAL INTRODUCTION: Scope of subject "Workshop Technology" in engineering. Different shop activities and broad division of the shops on the basis of nature of work done such as (i) Wooden Fabrication (Carpentry) (ii) Metal Fabrication (shaping and Forming, Smithy, Sheet metal and Joining-welding, Riveting, Fitting and Plumbing.

UNIT II **(8 sessions)**
CARPENTRY: Timber, seasoning of timber, types of seasoning. Common Carpentry Tools-Their classification, size, specification (name of the parts and use only)., Fundamental wood working operations, Marking & Measuring, Holding & Supporting, Cutting & Sawing, Drilling & Boring, Turning, Jointing;

UNIT III **(8 sessions)**
METAL FABRICATION: Metal Shaping-Smithy: Operations involved (concept only. Tools and equipment used (Names, size, specification for identification only). Defects likely to occur during and after operations their Identification and Remedy. Defects due to wrong operation, wrong tool and wrong heating. Safety of Personnel, Equipment & Tools to be observed. Sheet metal working: Tools and Operations involved (Names and concept only); Sheet metal joints - Lap, seam, Locked seam, hemp, wire dedge, cup or circular, Flange, angular and cap. Common defects -Their identification and remedy. Defects due to wrong operation or wrong tool. Safety of Personnel, Equipment & Tools to be observed.
Metal Joining During Fabrication: Permanent Joining-Welding Methods-Forge welding, gas welding (high and low pressure-oxyacetylene welding, types of flames. Electric Arc welding- D.C. & A.C., Connected tools, operation, materials and safety measures. Soldering & Brazing:
Familiarity with The Use of Various Tools Used in Mechanical Engineering Workshop: Marking & Measuring, Holding Tools. Cutting Tools.
Hack saw (Fixed and Adjustable frame), chisels. Finishing tools-Files. Drills and Allied Tools. Miscellaneous Tools.

UNIT IV **(8 sessions)**
MACHINE SHOP: Introduction to machine tools viz lathe, drilling machine, shaper and planer simple line and block diagram of components and their functions. Brief concept of NC and CNC machines.

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Diploma (Civil Engineering)

UNIT V **(8 sessions)**

Foundry: Basic idea of types of sands, patterns, moulds, furnaces and simple green sand moulding process

Course Outcomes:

Students completing this course will be able to:

- Practice workshop safety rules effectively.
- Acquire knowledge and use simple hand tools.
- Acquire knowledge and use of carpentry work.
- Acquire knowledge and use of the metal fabrication work.
- Acquire knowledge about different machines: Lathe, Drilling, Shaper and Planer etc.
- Makes the students' ability to understand about the basics of the foundry.

Suggested Reading:

1. Manufacturing Process by- B.S Raghuvanshi (Dhanpat& Co.)
2. Elementary Workshop Technology by- S.K HazraChaudhary (Media Promoters)
3. Workshop Practice by- S.K Garg (University Science Press)
4. Elementary Workshop Technology by J.K.Kapoor, Bharat BhartiPrakashan.

Website Sources:

- www.onlinecourses.nptel.ac.in
- https://www.pdfdrive.com/introduction-to-basic-manufacturing-processes-and-workshop-technology-e33408290.html
- https://books.google.co.in/books/about/Workshop_Technology.html?id=m6lDDAAAQBAJ&redir_esc=y

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DME -151: ENGINEERING DRAWING LAB

Objective:

1. To get the primary concept of Engineering Drawing.
2. To know about equipment's in Engineering Drawing.
3. To know various signs, lines and dimensions.
4. To know about the Principles of Projection: Orthographic Projections, Isometric Projection.

LIST OF EXPERIMENTS: **(20 Sessions)**

1.Drawing, instruments and their uses.

1.1 Introduction to various drawing, instruments.
1.2 Correct use and care of Instruments.
1.3 Sizes of drawing sheets and their layouts.

2. (a) Lettering Techniques

Printing of vertical and inclined, normal single stroke capital letters.
Printing of vertical and inclined normal single stroke numbers. Stencils and their use. (**1 Sheet)**
(b) Introduction to Scales Necessity and use, R F Types of scales used in general engineering drawing. Plane, diagonal and chord scales.**(1 Sheet)**

3.Conventional Presentation :

Thread (Internal and External), Welded joint, Types of lines, Conventional representation of materials, Conventional representation of machine parts. (**2 Sheet)**

4.(a) Principles of Projection

Orthographic, Pictorial and perspective. Concept of horizontal and vertical planes. Difference between I and III angle projections. Dimensioning techniques. (**1 Sheet)**
(b) Projections of points, lines and planes. (**1 Sheet)**

5 (a) Orthographic Projections of Simple Geometrical Solids Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles with reference planes.
(b) Orthographic views of simple composite solids from their isometric views.
(c) Exercises on missing surfaces and views (**3 Sheet)**

6. Section of Solids Concept of sectioning Cases involving cutting plane parallel to one of the reference planes and perpendicular to the others. Cases involving cutting plane perpendicular to one of the reference planes and inclined to the others plane, true shape of the section(**1 Sheet)**

7. Isometric Projection. (**2 Sheet)**
Isometric scale Isometric projection of solids.

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Diploma (Civil Engineering)

8. ORTHOGRAPHIC PROJECTION OF MACHINE PARTS: (**2 Sheet)**
Nut and Bolt, Locking device, Wall bracket

Course Outcome:
After successful completion of this course, students will able to

- Identify and use differing drawing tools/instruments.
- Use the concept of projection for Mechanical Engineering Drawings.
- Prepare engineering drawing manually with given geometrical dimensions using prevailing drawing standards using proper scale.
- Visualize and draw the shape of simple object form orthographic view to vice versa

Suggested Reading:

1. Engineering Drawing by- B. Agrawal and C.M. Agrawal (McGraw Hill Education (India) Pvt. Ltd..).
2. Engineering Drawing by K. Venkata Reddy (BS Publication).
3. Engineering Drawing by. K. Dhawan (S Chand)

Website Sources:

- https://www.google.co.in/books/edition/Engineering_Drawing/VRf-AwAAQBAJ?hl=en&gbpv=1&printsec=frontcover
- https://www.engbookspdf.com/Drawing/textbook-of-engineering-drawing-second
- https://www.google.co.in/books/edition/A_Textbook_of_Engineering_Drawing_In_Fir/vTd3cJ91-RwC?hl=en&gbpv=1&printsec=frontcover

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DME -152 / 252: WORKSHOP LAB

Objective:

1. To understand how different objects can be made from the given raw material by using different mechanical tools.
2. To introduce students to the basic concepts of manufacturing via shaping, forming, machining
3. To develop a knowledge of appropriate parameters to be operations used for various machining.
4. To develop a knowledge of workshop practice and basic use of machine tools and workshop equipment

LIST OF EXPERIMENTS: **(20 Sessions)**

1. Carpentry Shop :

EX-1 Introduction & demonstration of tools used in carpentry shop
EX-2 Planning and sawing practice
EX-3 Making of lap joint
EX-4 Making of mortise and tenon joint
Ex-5 Making of bridle joint
EX-6 Making of dovetail joint
Ex-7 Making of any one utility article such as wooden picture frame, hanger, peg, name plate, etc.

2. Sheet Metal Working and Soldering Shop :

EX-1 Introduction & demonstration of tools used in Sheet metal working shop.
EX-2 Cutting, shearing and bending of sheet.
EX-3 To prepare a soap case by the metal sheet.
EX-4 To make a funnel with thin sheet and to solder the seam of the same.
EX-5 To make a cylinder and to solder the same.
EX-6 Preparation of different type of joints such as Lap joint-single seam, double seam. Hemp and wired joints.
EX-7 Study and sketch of various types of stakes/anvil.
EX-8 To braze small tube/conduit joints.

3. Fitting Shop :

EX-1 Introduction & demonstration of tools used in Fitting Shop.
EX-2 Hack sawing and chipping of M.S. flat.
EX-3 Filing and squaring of chipped M.S. job.
EX-4 Filing on square or rectangular M.S. piece.
EX-5 Making bolt & nut by tap and die set.
Ex-6 To drill a hole in M.S. Plate and taping the same to create threads as per need.
EX-7 Utility article-to prepare a screw driver or paper weight, double open mouth spanner for 18" hexagonal head of a bolt.

4. Plumbing Shop:

EX-1 Cutting and threading practice for using socket, elbow and tee etc. and to fit it on wooden practice board.
EX-2 Study of-bib cock, cistern or stop cock, wheel valve and gate valve etc.

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5. Smithy Shop :

EX-1 Study & Sketch of Tools used in smithy shop.
EX-1 To prepare square or rectangular piece by the M.S.rod.
EX-2 To braze M.S. Flats/Tipped tools on M.S. shank.
EX-3 To make a screw driver with metallic handle.
EX-4 To make a square or hexagonal bolt.
EX-5 To make a ring with hook for wooden doors.
EX-6 Utility article-to prepare a ceiling fan hook.

6. Welding Shop :

EX-1 Welding practice-gas and electric.
EX-2 Welding for lap joint after preparing the edge.
EX-3 Welding of Butt joint after preparation of the edge.
EX-4 'T' joint welding after preparation of edge.
EX-5 Spot welding, by spot welding machine.
EX-6 Welding of plastic pieces by hot strip method.
EX-7 Welding practice by CO2 gas welding

7. Machine Shop

EX-1 Study & sketch of lathe machine.
Ex-2 Plain and step turning & knurling practice.
Ex-3 Study and sketch of planning/Shaping machine and to plane a Rectangle of cast iron.

8. Fastening Shop

EX-1 Practice of bolted joints
EX-2 To prepare a rivetted joint
EX-3 To make a pipe joint
EX-4 To make a threaded joint
EX-5 Practice of sleeve joint

Course Outcome:

After successful completion of this course, students will able to

- Acquire skills in basic engineering practice.
- Identify the hand tools and instruments, gain measuring skills and Obtain practical skills in the trades.
- Read and use a manufacturing drawing as a definition for the manufacturing of a part.
- Select proper tools and cutting data for a given material and manufacturing process.

Suggested Reading:

1. A Textbook of Workshop Technology: Manufacturing Processes by R.S Khurmi and J.K Gupta (S Chand).
2. Introduction to Basic Manufacturing Processes and Workshop Technology by Rajinder Singh

Website Sources:

- https://www.abebooks.com/servlet/BookDetailsPL?bi=30061491479&cm_sp=rec-_-pd_hw_i_1-_-bdp&reftag=pd_hw_i_1

UNIVERSITY POLYTECHNIC
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IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DME -201: ELEMENTARY MECHANICAL ENGINEERING

Objective:
To provide a comprehensive knowledge of basic mechanical systems, basic concepts from mechanical engineering sciences. Modern engineering tools (machine-tools) and related subjects to design mechanical engineering components.

UNIT I **(8 sessions)**

Thermal Engineering: A. SOURCES OF ENERGY; Basic ideas, conventional and nonconventional forms- Thermal, Hydel, Tidal, wind, Solar, Biomass and Nuclear and their uses. B. FUELS & COMBUSTION; Introduction to common fuels - solid, liquid and gases and their composition. Combustion of fuels- their higher and lower calorific values. Combustion equations for carbon, Sulphur, hydrogen and their simple compounds. Calculation of minimum amount of air required for complete combustion. Combustion analysis on mass basis and on volume basis. Concept of excess air in a boiler furnace combustion. Heat carried away by flue gases. Analysis of flue gases by Orsat apparatus. Simple numerical problems Idea of specific properties of liquid fuels such as detonation, knock resistance (cetane and octane numbers), viscosity, solidification point, flash point and flame point.

UNIT II **(8 sessions)**

MACHINE COMPONENTS: Brief Idea of loading on machine components. (i) Pins, Cotter and Knuckle Joints. (ii) Keys, Key ways and spline on the shaft. (iii)Shafts, Collars, Cranks, Eccentrics.(vi) Couplings and Clutches. (v) Bearings-Plane, Bushed, Split-step, ball, Roller bearing, Journal bearing, Foot step bearing, thrust bearing, collar bearing and Special type bearings and their applications. Selection of ball bearing and roller bearing for given application using design data book.

UNIT III **(8 sessions)**

(i) Gears : Different types of gears, gear trains and their use for transmission of motion. Determination of velocity ratio for spur gear trains; spur gear, single and double helical gears, Bevel gears, Mitre wheel, worms, Rack and Pinion. Simple and compound and epicyclic gear trains and their use. Definition of pitch and pitch circle & module. (ii) Springs: Compression, Tension, Helical springs, Torsion springs, Leaf and Laminated springs. Their use and material. Selection of spring by design data book, simple numerical problem.

UNIT IV **(8 sessions)**

MECHANISMS: Definition of link, Frame and mechanism. Difference between machine and mechanism, kinematic pairs, lower and higher pairs. Velocity diagram for four bar mechanism, slider crank mechanism, quick return mechanism. Introduction to Cam and its use.

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UNIT V **(8 sessions)**

LUBRICATION: Different lubrication system for lubricating the components of machines. Principle of working of wet sump and dry sump system of lubrication. (Explained with simple line diagram). Selection of lubricant based on different application (Requirement with the help of manufacturer catalogue).

Course Outcomes:

Students completing this course will be able to:

- Acquire knowledge about thermal engineering with different energy sources .
- Understand about different mechanical components with their applications.
- Acquire knowledge about different mechanisms used in mechanical machines.
- Acquire knowledge about lubrication systems.

Suggested Reading:

1. Elements of Mechanical Engineering by J.K.Kapoor (Bharat BhartiPrakashan).
2. Elements of Mechanical Engineering by R.P.Garg, BBP Pub. Pvt. Ltd, Meerut.

Website Sources:

- www.onlinecourses.nptel.ac.in

UNIVERSITY POLYTECHNIC
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IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DEE-101/ DEE-201: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Objective: The objective of this course is to provide an understanding of basic terms related to the electrical and electronics engineering. It provides knowledge of basic elements used in electrical and electronics circuits, to develop the capability of analyzing and design simple electrical networks, an understanding of basic principle of various network theorems, an introductory knowledge of single phase and three phase AC supply, an introductory knowledge of semiconductor materials and devices manufactured by them like a PN junction diode and Bipolar Junction Transistor.

UNIT I **(08 Sessions)**

Basic Terminology & Their Concepts : Current, EMF, Potential difference, Resistance, Resistivity, & their units, Variation of resistance with temperature, Series & parallel connection of resistors, conductors and insulators, Electrical power & energy, Concept of inductance & mutual inductance, mutually induced emf and its role in electric circuits. Energy stored in an inductor, Concept of capacitor, parallel plate capacitor & its capacitance, energy stored in a capacitor, Dielectric and its influence on the capacitance of a capacitor. Charging & discharging of capacitor. Simple numerical problems

UNIT II **(08 Sessions)**

D.C. Circuits: Kirchhoff's laws-KCL & KVL, simple numerical problems.

Network Theorems- Thevenin's theorem, Norton's theorem, Superposition & Maximum power transfer Theorem, Simple numerical problems based on them

UNIT III **(08 Sessions)**

A.C. Circuits: Instantaneous value, RMS value, Peak value, Average value. Form factor & peak factor of a sine wave. Concept of phase, phase difference & phasor representation of ac voltage & current, R-L, R-C, R-L-C circuits, Active & Reactive power, power factor Simple numerical problems.

Poly-phase Systems: Advantages of a 3-phase system over single-phase system, Star & Delta connections & their conversion, Relationship between phase & line values of currents and voltages, Power in 3 phase system

UNIT IV **(08 Sessions)**

Magnetic Circuits: Magnetic circuit concepts- magnetic field intensity, magneto motive force, magnetic flux density**,** Permeability, Reluctance, Determination of Ampere turns, Kirchhoff's Law for magnetic circuit, Analogy between magnetic and electric circuits, Composite magnetic circuits, B-H characteristics, Hysteresis loss

UNIT V **(08 Sessions)**

Semiconductors: Classification of solids- conductors, Insulators & semiconductors, Intrinsic & Extrinsic semiconductors, P-N junction- biasing, VI characteristics of a diode.

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Bipolar Junction Transistors: Biasing, working of NPN & PNP transistor, Transistor configurations- common emitter, common base common collector configurations and their characteristics, Transistor as an Amplifier, Simple numerical problems, Transistor as a switch-use of transistor as a switch for logic gates.

Combinational logic circuits: Logic gates- AND, OR, NOT, Exclusive OR, NAND & NOR gates with their truth tables

Course Outcomes:

Students completing this course will be able to:

- The students are able to explain the various types of electrical and electronics circuits.
- Can solve a simple type of electrical network problems.
- It imparted the understanding of single phase and three phase AC supply and also the superiority of three phase supply over single phase supply.
- Students got an idea about magnetic field and how it is utilized.
- The students have got an understanding of applications of semiconductor materials and devices based on them.

Suggested Readings:

1. Electrical Engineering- Ashfaq Hussain, Dhanpat Rai & Co.
2. Electrical Engineering- J.S. Katre. Tech. Max Publications.
3. Electrical Engineering-Vol.-1. B.L. Thareja-Technical Publications.
4. I.J. Nagarath, " Basic Electrical Engineering" Tata McGraw Hill
5. Electrical and Electronics Engineering by S.K. Sahdev

Web Resources:

- www.engineering.nyu.edu
- www.elprocus.com/basics-of-network-theorems-in-electrical-engineering/
- www.electricalclassroom.com
- www.electronics-tutorials.ws/electromagnetism

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DEE-151/ DEE-251: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

Objective: The objective of this lab is to provide an understanding of basic electrical and electronic components used in various types of circuits, to know how the basic principles of electrical and electronic engineering like Ohm's Law, KCL, KVL work. To know about how the electricity consumed in a circuit is measured by the energy meter. To know how the resistance of a filament varies according to temperature, to know the working of electronic devices like a PN junction diode and NPN/PNP transistors and logic gates.

LIST OF EXPERIMENTS: **(20 Sessions)**

1. To study and identify the various components.
2. To verify Ohm's Law.
3. To verify Kirchhoff's Current Law (KCL).
4. To verify Kirchhoff's Voltage Law (KVL).
5. To observe the variation of resistance of a lamp with temperature by plotting V-I curve for 60 W and 100 W filaments lamp.
6. To study Star to Delta and Delta to Star conversion.
7. To verify the truth table of OR, AND, NOT, NAND, NOR and EXOR logic gates.
8. To study and plot V-I characteristics of a PN junction diode.
9. To study the biasing and working of NPN/PNP transistor.
10. To study a single-phase Induction type energy meter.

Course Outcomes:

Students completing this course will be able to:

- The students are able to know the identification and application of the various types of components used in electrical and electronics circuits.
- Can understand how Ohm's Law works and its limitations.
- It imparted the understanding of KCL, KVL and their applications.
- Students got an idea about the variation of resistance with temperature and working principle of an energy meter & its use.
- The students have got an understanding of working and application of semiconductor devices.

Suggested Readings:

1. Handbook of laboratory experiments in electronics engineering by A.M. Zungeru
2. Basic electrical and electronics lab by Bharat Bhushan Jain
3. Laboratory Manual for Introductory Electronics Experiments by L.K. Maheshwari.

Website Sources:

- www.concept-of-physics.com/electromagnetism/verification-of-ohmas-law-using-voltmeter-and-ammeter.php
- www.jetir.org

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DCS 101/201: COMPUTER FUNDAMENTALS AND PROGRAMMING IN C

Objective: To study about understanding of basic concepts of computer fundamentals, operating system, primary and secondary memory in detail, peripheral devices and basic concepts of C programming language.

UNIT I **(09 Sessions)**

Introduction to Computer: Definition, Characteristics, Generation of Computers, Capabilities and Limitations, Introduction to Operating System, Concept of Bios, Booting Files, Basic Components of a Computer System-Control Unit, ALU, Input/output functions and characteristics. Memory Introduction, Classifications- Volatile Memory and Non- Volatile, Flash Memory, ROM, RAM, EPROM, PROM, EEPROM other types of memory.

UNIT II **(07 Sessions)**

Input/output and storage Units: Computer Keyboard, Pointing Devices: Mouse, Trackball, Touch Panel, and Joystick, Light Pen, Scanners, Various types of Monitors, Touch-sensitive screens, Optical Recognition System, Pen based systems, Digitizers, MICR, OCR, OMR, Bar-code Reader, digital camera. Hard Copy Devices:- Impact and Non- Impact Printers- Daisy Wheel, Dot Matrix, Line Printer, Chain Printer, Comb Printers, Non-Impact Printers- Desk Jet, Laser Printer, Thermal Transfer Printer, Barcode Printers, Electro static printers and plotters, High Level Language and Low-Level Language, Firmware, Compiler, Interpreter and Assembler.

UNIT III **(12 Sessions)**

Introduction and Features of "C" language: The structure of "C" program , Identifiers and Keywords, Constants, Variables, Scope of variables, Typedef, Type Conversion, Arithmetic Operators, Library Functions, Input/output Statements, get char(), Putchar(), scanf, print, Compound statements and block. Relational Operators, Logical Operators, Bitwise Operators, Unary Operators, if-else Statement, Operators, Switch statement, goto statement and Label, Iteration statements: For Loop, While Loop, Do While Loop, Nested Loop, Continue and Break statements.

UNIT IV **(06 Sessions)**

Array and Structures: Declaration, Concept of One Dimensional and Multi-Dimensional arrays, Defining Structure, Declaration of Structure Variable, Accessing Structure members, nesting of structures,Array of structures.

UNIT V **(08 Sessions)**

Difference between Union and Structure: Functions: Need of "C" function, User Defined and Library Functions, Prototype of Function, Call by Value, Call by Reference, Nesting of Functions, Recursion, Array as Function Argument, Structure as Function Argument.

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Course Outcomes:

Students after this course will be able to:

- Define computer, its characteristics and generation of computer.
- Explain about detailed description of the computer's memory and its types.
- Describe about the operating system and its functions.
- Explain about input and output devices.
- Explain the features of the C language, keyword, data type and statements in C.
- Make C programs with the help of array, structure and nesting of structure.
- Differentiate between structure and union.

Suggested Readings:

1. Computer Fundamentals B. Ram
2. Computer fundamentals P.K Sinha (BPB Publications)

Website Sources:

- https://www.tutorialspoint.com/computer_fundamentals/index.htm
- https://www.javatpoint.com/computer-fundamentals-tutorial
- https://www.w3schools.in/c-tutorial/
- https://www.geeksforgeeks.org/difference-between-input-and-output-devices/
- https://en.wikipedia.org/wiki/C_(programming_language)
- https://www.cprogramming.com/

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DCS 151/251: COMPUTER PROGRAMMING LAB

Objective: To study about understanding of basic concept of Windows Operating System, understanding of the fundamentals of programming such as data types, keywords, variables, array, structure, conditional and iterative execution, methods, etc.

LIST OF EXPERIMENTS: **(20 Sessions)**

1. Introduction to GUI using Windows Operating System, DOS Commands,
2. Introduction to Word, Introduction to MS-Excel.
3. WAP in C to print your name.
4. WAP in C for adding, subtraction, multiplication & division of two numbers.
5. WAP in C to calculate the area of a circle, rectangle and triangle.
6. WAP to Convert Celsius to Fahrenheit.
7. WAP to find out whether the given year is a leap year or not.
8. WAP in C to find whether the given number is even or odd.
9. WAP to use switch statement display Monday to Sunday.
10. WAP to print table of given number.

Course Outcomes:

Students after this course will be able to:

- Explain about GUI using windows operating system and DOS commands.
- Make simple C programs.
- Explain about statements in C language and how to use arrays and functions in C programs.
- Make C programs with the help of array, structure and nesting of structure.
- Make C programs with the help of functions.

Suggested Readings:

1. Computer Fundamentals B. Ram
2. Computer fundamentals P.K Sinha (BPB Publications)

Website Sources:

- https://www.programiz.com/c-programming#introduction
- https://www.javatpoint.com/c-programming-language-tutorial
- https://www.w3schools.in/c-tutorial/
- https://www.tutorialspoint.com/cprogramming/index.htmhttps://en.wikipedia.org/wiki/C_(programming_language)
- https://www.cprogramming.com/

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FEC-101/FEC-201: FUNDAMENTALS OF ENGLISH COMMUNICATION

Course Objectives: The objectives of Fundamentals of English Communicationare:

- To develop knowledge and understanding of grammar.
- To develop abilities to make use of the grammar in own writing English.
- To increase understanding and recall of what is read and listen including facts and main idea.
- To enhance competencies in writing paragraph, gist or abstract/précis of the passage in own words/ language and in writing letters and applications of different kinds.

UNIT I **(06 Sessions)**

Basic Applied Grammar and Usage

The Sentences: Kinds of Sentences; Subject and Predicate Phrases & Clauses, Idioms & Proverbs

UNIT II **(08 Sessions)**

Basic Applied Grammar Continued

Nouns: Kinds; Singular/Plural; Gender; Possession
Pronouns: Kinds; Usage
Adjectives: rees of Comparison; Usage
Determiners: Kinds, Usage of Adjectives and Determiners

UNIT III **(08 Sessions)**

Basic Applied Grammar Continued

Articles: Kinds, Omission of Articles, Repetition of Articles, Spotting the Errors
Verbs: Kinds-Transitive and Intransitive, Finite and Non-Finite Verbs
Tenses:Kinds; Usage

UNIT IV **(06 Sessions)**

Basic Applied Grammar Continued

Adverbs: Kinds; Position of Adverbs; Usage
Prepositions: Kinds; Correct Usage, Fill in the Blanks
Conjunctions:Kinds, Conversion of Compound to Complex Sentences and Vice-versa
Interjections: Definition and Types

UNIT V **(10 Sessions)**

Comprehension and Précis Writing, Reading Comprehension Précis Writing: Techniques of Précis Writing and ExercisesFormal Letter Writing: Leave Application (for different reasons), Application for Fee Concession and Invitation (for family and friends)

Suggested Readings:

1. Professional Communication by Malti Agarwal, Krishna Publications.
2. High School English Grammar & Composition by Wren & Martin, S. Chand & Company LTD., New Delhi.

Course Outcomes: After completing this course, Students will be able to:

- Develop knowledge and understanding of grammar and abilities to make use of the grammar in own writing English.
- Increase understanding and recall of what is read and listen including facts and main idea.
- Enhance competencies in writing paragraph, gist or abstract/précis of the passage in own words/ language and in writing letters and applications of different kinds.

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DME -301: MATERIAL SCIENCE & ENGINEERING

Objective: The objective of this course provides students an introduction to metals, ceramics, polymers, an understanding of basic structure and crystal arrangement of materials, Phase diagrams, advantages of heat treatment and the method of heat treatment processes.

UNIT-I **(06 sessions)**

General:

Brief introduction to the subject metallurgy and its scope in engineering field, classification of materials of industrial importance. Their chemical thermal, electrical, magnetic, mechanical and technological properties and their selection criteria for use in industry.

UNIT-II **(10 sessions)**

Structures of metals and their deformation:

Structure of metals and its relation to their physical, mechanical and technological properties. Elementary idea of arrangement of atoms in metals, molecular structures crystal structures and crystal imperfections. Deformation of metals, effects of cold and hot working operations over them. Recovery recrystallization and grain growth, solid solutions, alloys and inter metallic compounds, allotropy of metals, effect of grain size on properties of metals. Corrosion its causes and prevention.

UNIT-III **(12 sessions)**

Properties and usage of metals:

(1) Metals

(a) Ferrous Metals.

(b) Non-Ferrous Metals.

(2) Nonmetallic Materials.

1. Metals:

(a) Ferrous Metals:

- **i.** Classification of iron and steel. Sources of iron ores and places of availability. Outline of manufacture of pig iron, wrought iron, cast iron and steel. (Flow diagram only)
- **ii.** Cast iron: Types as per I.S. - White, malleable, grey mottled, modular and alloy, properties and common uses.
- **iii.** Classification of steels according to carbon content and according to use as per I.S. Mechanical properties of various steels and their uses. Name and places of steel plant in India. Availability of various section of steel in market, its forms and specifications.
- **iv.** Alloy Steel : Effect of alloying various elements, viz Cr, Ni, Co, V, W, Mo, Si and Mn on mechanical properties of steel, Common alloy steels, viz,

(a) Ni-Steel (b) Ni-Cr-steel (c) Tungsten Steel (d) Cobalt steel (e) Stainless steel (f) Tool steel- High Carbon Steel, High Speed tool Steel, Satellite Metal, Tungsten Carbide Diamonds. (g) Silicon manganese steel (h) Spring steel (i) Heat resisting alloy steels (Nimonic steels). (j) Impact hardening steel

(b) Non-ferrous Materials:

- **i.** Important ores and their metal content, outline of manufacturing methods, trade names, properties (Phy/Mech./Elect.) and use of the following metals: Aluminum, Zinc, Copper, Tin, Silver, Lead.
- **ii.** Base metal with principle alloying elements (I.S.I. specification). Important properties and use of the following alloys:
  - **a)** Aluminum Alloys: Aluminum-Copper alloy, Al, Zn alloy, Aluminum- Silica Alloy-Al-Ni-Alloy, Dialuminium-derived alloys (R.R. and Y-alloy).
  - **b)** Copper Alloys: Brass, Bronze, Gun metal, Phosphor Bronze, Aluminum Bronze, Ni Bronze.
  - **c)** Nickel Silver: Nickel-Copper Alloy (monel metal) Inconel, Nickel, Silver.
  - **d)** Bearing Metals: Lead base alloys, tin base alloys. (White metals or babbit metals) Copper base alloys.
  - **e)** Solders: Solders-(Lead, Tin solder, Plumber solder, Tinman's solder or Tin solder) Silver solder, Brazing alloys (spelter), Inconel alloys.

2. NON-METALIC MATERIALS:

- **a)** Timber: Conversion of Timber: Its meaning necessity, Seasoning of timber, Preservation of Timber: Types of preservation, Methods of application, Defects in timber, Surface treatment, Soaking treatment, Hot and Cold treatment; Common Indian timber specific uses, properties identification, units of purchase.
- **b)** Plastic and Other Synthetic Materials: Plastics-Important Sources-Natural and Synthetic, Classification, thermo set and thermoplastic, Various trade names, Important Properties and engineering use of plastics. Market forms-Pallets, Granules, Powder and Liquid forms; Uses of Sunglass rexin, Linoleum

UNIT-IV **(06 sessions)**

Identification and Testing of Metal Alloys:

Selection, specification forms and availability of materials. Testing of materials (Destructive and non-destructive), Identification of metal by giving mini project.

UNIT-V **(06 sessions)**

Heat Treatment of Metals:

Elementary concept, purpose, Iron-carbon equilibrium diagram.T.T.T. or 'S' curve in steels and its significance, micro structure of steels and martensitic transformation (elementary idea). Hardening, Tempering, Annealing, Normalising and case hardening. Ageing, Various temperature ranges for different metals and alloy (From heat treatment hand book).

Suggested Readings:

1. W.D. Callister, Jr, - Material Science & Engineering Addition-Wesley Publication.
2. K.M.Gupta, Materials Science, Umesh Publication.
3. Van Vlash - Elements of Material Science & Engineering John Wiley & Sons.
4. V. Raghvan - Material Science, Prentice Hall.

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Program Outcomes:

Upon completion of this course the student will be able to:

1. Identify the properties of metals with respect to crystal structure and grain size.
2. Interpret the phase diagrams of materials.
3. Classify and Distinguish different types of cast irons, steels and nonferrous alloys.
4. Describe the concept of heat treatment of steels & strengthening mechanisms
5. Use the fundamental science and engineering principles relevant to materials to identification and testing of metal alloys.

Website resources:

- https://nptel.ac.in/courses
- https://en.wikipedia.org
- www.youtube.com
- https://www.asm-recycling.co.uk/ferrous-and-non-ferrous-metals/
- https://web.adanabtu.edu.tr
- https://www.weldinghandbook.com/types-of-metals/metal-identification/
- https://www.machinedesign.com/materials

Note: Latest editions of all the suggested readings must be used

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DCE -302: INTRODUCTORY STRENGTH OF MATERIALS

Objective: In mechanics of materials, the strength of a material is its ability to withstand an applied load without failure or plastic deformation. Strength of materials basically considers the relationship between the external loads applied to a material and the resulting deformation or change in material dimensions. In designing structures and machines, it is important to consider these factors, in order that the material selected will have adequate strength to resist applied loads or forces and retain its original shape. Strength of a material is its ability to withstand this applied load without failure or plastic deformation

UNIT I **(08 Sessions)**

Classification of materials Elastic materials, plastic materials, ductile materials and brittle materials. Stresses and strain: introduction, types of stresses and strain, hook's law. Permissible stresses, principle of superposition and composite sections. Thermal stresses, Poisson's ratio and volumetric strain. Elastic modulus with their relationship.

UNIT II **(10 Sessions)**

Shear force and bending moment: Type of Support, type of beams, type of load. Shear force and bending moment. SFD and BMD for cantilevers, simply supported and overhanging beam for concentrated and uniformly distributed load. Relationship between S.F and B.M

UNIT III **(10 Sessions)**

Geometrical properties of area: Center of area or centroids, moment of inertia and second moment of area. Theorem of parallel and perpendicular axes. Second moment of area of rectangular, circular, T, I, L and built-up section

UNIT IV **(06 Sessions)**

Bending stresses in beams: concept of pure/simple bending, assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T & L sections only, moment of resistance, calculations of bending stresses in simply supported beam.

UNIT V **(08 Sessions)**

Columns and struts: Introduction, short and long columns. Euler's theory; assumptions, derivation for Euler's buckling load for different end conditions, limitations of Euler's theory. Rankin-Gordon's formula for columns.

Course Outcomes:

Students completing this course will be able to:

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- Analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
- Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.
- Perform engineering work in accordance with ethical and economic constraints related to the design of structures and machine parts.
- Covers combined stresses and properties of structural materials.

Suggested Readings:

1. Ramamrutham, S.: Strength of Materials. DhanpatRai and sons, New Delhi.
2. Punmia, B.C.: Strength of Materials. Standard publishers, Delhi.

Website Sources:

- https://nptel.ac.in/courses/105/105/105105108/
- https://lecturenotes.in/notes/7133-notes-for-strength-of-materials-som-by-abhishek-apoorv?reading=true

Note: Latest editions of all the suggested readings must be used

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DCE -303: PUBLIC HEALTH ENGINEERING

Objective: The objective of this course is to familiarize the students with the quantity and quality of water, demand for water, population forecasting, and sanitation system of water. It also includes a brief idea regarding water supply and its treatment before supplying to the consumers and the disposal of the sewage.

UNIT I **(10 Sessions)**

Introduction: Necessity and a brief description of the water supply system. Water requirement Per capita consumption for domestic, industrial, public and firefighting uses as per IS standards. Consumption, demand, and its variation.Quality of water and suitability. Water Treatment: Suspended colloidal and dissolved impurities. Physical, chemical and bacteriological tests and their significance. Minimum standards are required for drinking water. Principles of Sedimentation, Coagulation, Flocculation, Filtration, Disinfection, Disinfection (Chlorination), including Jar Test, Break Point Chlorination, and Residual chlorine. Function, constructional details, working and operation of (i) Aeration fountain (ii) Mixer (iii) Flocculator (iv) Clarifier (v) Slow and rapid sand filter (vii) Chlorination chamber (viii) Water Softening.

UNIT II **(08 Sessions)**

Water Distribution:(i)Pipes: Different types of pipes cast iron, steel, plastic, (PVC, LDPE, HDPE), asbestos cement, concrete, plastic, GI, and lead pipes, Details of their sizes, joints and uses. (ii)Appurtenances: Sluice (Gate and spindle), air, reflux, scour and safety valves, fire hydrants, their working and uses. (iii)Distribution system: Requirements of distribution. Minimum head and rate. Types of lay out-dead end, grid, radial and ring systems. System of water supply-intermittent and continuous.

UNIT III **(06 Sessions)**

Waste: Dry, semi-liquid, liquid, Necessity of systematic collection and disposal of waste. Brief description of the sewage disposal system.Conservancy and Water carriage system, their advantages and disadvantages.

UNIT IV **(06 Sessions)**

Quantity of Sewage:

a) Sewage**:** Domestic, industrial and storm water
b) Volume of domestic sewage (DWF), thevariability of flow, limiting velocities in sewers.

UNIT V **(10 Sessions)**

Sewerage Systems:

a) Types of sewerage systems separate, combines, and partially separate.
b) Sewers: Stoneware, cast iron, concrete, and masonry sewers their sizes and joints.

c) Appurtenances: (Location, function and construction) manholes, drop manhole, lamp hole catch basin, inverted siphon, flushing tanks, ventilating shafts, and storm water flows.

Course Outcomes:

Students completing this course will be able to:

- To know about the quality and quantity of water.
- To know the treatment of water & distribution system.
- To know the sanitation system and disposal of the sewage.
- To know about drains and sewer sections.

Suggested Readings:

1. Punmia, B.C.: Water Supply Engineering part-I. Laxmi Publications.
2. Punmia, B.C.: Waste Water Engineeringpart-II. Laxmi Publications.
3. Lal, D. and Upadhyay, A.K.: Water Supply and Waste Water Engineering. S K Kataria& Sons
4. Garg S.K. Water Supply Engineering Khanna publication

Website Sources:

- https://nptel.ac.in/
- https://sctevtservices.nic.in/
- http://www.sgipolytechnic.in/civil

Note: Latest editions of all the suggested readings must be used

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DCE -304: SURVEYING PRACTICE-I

Objective: The aim of surveying is to prepare a map to show the relative positions of the objects on the surface of the earth also to collect field data. To prepare plan or map of the area surveyed. To analyse and calculate the field parameters for setting out operation of actual engineering works. To set out the field parameters at the site for further engineering works.

UNIT I **(08 Sessions)**

Introduction: Concept of surveying, purpose of surveying. Measurements linear and angular, units of measurement, instruments used for taking these measurements. Classification of survey based on instruments. Basic principles of surveying.

UNIT II **(10 Sessions)**

Chain Surveying: Purpose of chain surveying. Principles of chain surveying. Equipment used in chain surveying Viz. chains, tapes, ranging rods, arrows, pegs, cross staffs, India optical square their construction and uses different operations in chain surveying Ranging (direct/indirect), offset (perpendicular/oblique), chaining (flat and sloping ground), conducting chain survey over an area Recording the field data, plotting the chain surveying.

(a) Errors in chain surveying.

(b) Correction for erroneous length of chain, simple problems. Testing and adjustment of chain.

UNIT III **(10 Sessions)**

Compass Surveying: Purpose of compass surveying. Construction and working of prismatic compass. Use of prismatic Compass. Method of setting and taking observations. Concept of following.(a) Meridian -Magnetic, true and arbitrary, (b) Bearing- Magnetic, true and arbitrary. (c) Whole circle bearing and reduced Bearing. (d) Fore and back bearing. (e) Magnetic dip and declination Local attraction-causes, detection, errors and correction. Problems on local attraction, magnetic declination and calculation of included angles in a compass traverse.

UNIT IV **(06 Sessions)**

Traversing: Concept of traverse. Open and closed traverse. Traversing with a prismatic compass.Checks for an open and closed traverse. Plotting of a traverse- By included and deflection angles. Concept of closing error Adjustment of traverse graphically by proportionate method. Errors in compass surveying Testing and adjustment of a prismatic compass. Use of surveyor's compass and its construction details, comparison with prismatic compass.

UNIT V **(10 Sessions)**

Leveling: Purpose of leveling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and bench marks. Principle and construction of dumpy, I.O.P. (tilting) levels. Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis. Leveling staff (i) single piece (ii) folding (iii) sop with (iv) invar precision staff. Temporary adjustment setting up and leveling, adjusting for parallax of Dumpy and I.O.P. level. Differential

leveling, concept of back sight, foresight, intermediate sight, station, change point, height of instrument Level book and reduction of levels by (a) Height of collimation method and (b) Rise and fall method. Arithmetical checks.Problem on reduction of levels. Contours.

Course Outcomes:

Students completing this course will be able to:

- To determine the relative position of any objects or points of the earth.
- To determine the distance and angle between different objects.
- To prepare a map or plan to represent an area on a horizontal plan.
- To develop methods through the knowledge of modern science and the technology and use them in the field.
- To solve measurement problems in an optimal way.

Suggested Readings:

1. Punmia, B.C.: Surveying. Laxmi Publications.
2. Basak, N.N.: Surveying and Leveling. McGraw Hill Education (India).

Website Sources:

- http://nptel.ac.in/video.php?subjectId=105104101
- http://media.sakshat.ac.in/NPTEL-IIT-Videos/
- http://nptel.iitk.ac.in/courses/Civil_Eng/IIT%20Roorkee/Surveying.htm
- http://nptel.iitk.ac.in/

Note: Latest editions of all the suggested readings must be used

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DCE- 305: BUILDING CONSTRUCTION & MAINTENANCE

Objective: The main objective of this course is to provide knowledge of building components and its different material

UNIT I(04 Sessions)

Introduction: Definition of a building, classification of buildings based on occupancy, requirements of a good residential building. Different parts of a building.

UNIT II(08 Sessions)

Foundations: Functions of foundation, objects of foundation, general inspection of sites.Types of foundations shallow and deep Spread foundations for walls, Raft foundation, combined footing, grillage foundation, causes of failure of foundation.

UNIT III(10 Sessions)

Masonry: Types of Brick and stone masonry. Selection of suitable type of masonry Construction procedures, Mortar - Types & specific uses.**Building Components:** Door, window, ventilator, cup-board, wardrobe, etc. Floors, types and methods of construction, floor finishes. Roof, roof coverings and false ceilings. Vertical circulation (stair, lift)

UNIT IV(10 Sessions)

Building Items: Plastering & pointing- its purpose, various types, construction procedures, advantages and disadvantages, suitability of each. Damp proof course (DPC), Anti-termite measures and treatments. Grouting- its purpose, construction procedures, advantages and disadvantages. Example of specific uses.**Scaffolding and Centering:** Purpose& types of scaffolding and centering, Suitability of scaffolding as per situations and type of structures. Erection of centering for different components.

UNIT V(08 Sessions)

Building Maintenance: Purpose, need, importance, methods, Causes and types of defects in buildings, Preparation of report on maintenance work including estimating, Remedial measures and execution procedure of any one type of building maintenance work.

Course Outcomes:

Students complete this course will be able to:

- Building and its different classification
- Foundation and its classification
- Building Components**:** Door, window, ventilator, cup-board, wardrobe, etc.
- Scaffolding and centering: purpose, type and its components

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Suggested Reading:

1. Duggal S K: Building Materials, New Age International
2. Varghese P.C.: Building Materials, PHI
3. Punmia B.C.: A Text Book of Building Construction. Laxmi Publications, Delhi.

Website Sources:

- http://ascelibrary.org/
- http://nptel.ac.in/noc
- CivilDigital.com

Note: Latest editions of all the suggested readings must be used.

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IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DME -351: MATERIAL SCIENCE LAB

Objective: The objective of this course provides students an introduction to metals, ceramics, polymers, an understanding of basic structure and crystal arrangement of materials, testing of the materials i.e., type of hardness testing, tensile test, microscope examination, bending moment diagrams and microstructural study.

1. To determine the ultimate tensile strength, its modulus of Elasticity, Stress at yield point, % Elongation and contraction in x-sectional area of a specimen by U.T.M. through necking phenomenon.
2. To determine the ultimate crushing strength of materials like steel and copper and compare their strength.
3. To determine Rock Well Hardness No. Brinell Hardness No. of a sample.
4. To estimate the Shock Resistance of different qualities of materials by Izod's test and charpy test.
5. To determine the bending moment at a given section of a simply supported beam for different loading.
6. To determine the various parameters of Helical coil spring.
7. To determine the angle of twist for a given torque by Torsion apparatus and to plot a graph between torque and angle of twist.
8. Study of diamond polishing apparatus.
9. Study metallurgical microscope.
10. (a) To prepare specimens for microscope examination (For Polishing and etching).
    (b) To examine the microstructure of the above specimens under metallurgical microscope.
    (c) To know composition of alloy steel by spebbersteeloscope
    (d) To know carbon in steel by carbon steel estimation apparatus
11. Preparation of specimens and study of microstructure of eight given metals and alloys on metallurgical microscope.
    a) Brass.
    b) Bronze.
    c) Grey Cast Iron.
    d) Malleable Cast Iron.
    e) Low Carbon Steel.
    f) High Carbon Steel.
    g) High Speed Steel.
    h) viii. Bearing Steel.
12. To perform heat treatment process on materials of known carbon percentage:

1. Annealing **2.** Normalizing 3.Case Hardening.

Course Outcomes:

Upon completion of this course the student will be able to:

- Conceptually explain the classification schemes that are used to categorize engineering materials.

- Able to explain the advantages and application of heat treatment processes.
- Able to describe why each of the fundamental mechanical engineering properties of materials covered in the course (stress, strain, elastic constant, creep, fatigue, wear, hardness, Poisson's ratio, toughness, ductility, flexural strength, impact strength, elongation) are important in engineering design.
- Calculate engineering stress, strain and the elastic modulus from data and for basic engineering applications.
- Able to select the appropriate engineering materials and size basic parts, including the use of appropriate safety factors and cost, for specific engineering applications using mechanical properties such as: yield strength, tensile strength, ductility or elongation, impact strength, toughness, Poisson's ratio, flexural strength, hardness, fatigue life, endurance limit, wear, and creep.

Website resources:

- https://nptel.ac.in/courses
- https://en.wikipedia.org
- https://www.weldinghandbook.com
- https://www.studocu.com/in/document/ymca-university-of-science-and-technology/mechanical-engineering/practical
- http://iitk.ac.in/mse/physicalmetallurgy
- http://www.iitk.ac.in/mse/MSE-Facilities/MTL

Note: Latest editions of all the suggested readings must be used.

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -353: PUBLIC HEALTH ENGINEERING LAB

Objective: The objective of this course is to familiarize the students with the study of water and its different test

LIST OF EXPERIMENTS:

1. To determine dissolved and suspended solids in water.
2. To determine pH value of water sample.
3. To determine turbidity of water.
4. To calculate: (i). Oxygen Demand (OD) (ii). Biological Oxygen Demand (BOD) (iii). Chemical Oxygen Demand (COD).
5. To determine residual chlorine in water sample.
6. To perform Jar Test for Coagulants.
7. To collect samples of water from shallow & deep wells.
8. To perform chlorine demand test.
9. To determine hardness of water.
10. To determine available chlorine in bleaching powder.
11. To perform field test for the detection of intermediate pollution in drinking water by OT test.
12. To visit and write specific report for the following: (Any three)

a) Water treatment plant for moderate town (say Polulation1lacs)
b) Sewage treatment plant for 5 lacks to 10 lacks population
c) Sewage disposal work
d) Construction site for layout of water supply & sewerage system.
e) Industrial effluent treatment plant

Course Outcomes:

Students completing this course will be able to:

- To know about the quality and quantity of water.
- To know the treatment of water & distribution system.

Suggested Readings:

1. Punmia, B.C.: Water Supply Engineering. Laxmi Publications.
2. Lal, D. and Upadhyay, A.K.: Water Supply and Waste Water Engineering. S K Kataria& Sons.

Website Sources:

- https://nptel.ac.in/
- https://sites.google.com/site/erkrashmifaculty/home/public-health-engineering/lecture-notes

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -354: SURVEYING PRACTICE -I LAB

Objective:

- To determine the relative position of any objects or points of the earth.
- To determine the distance and angle between different objects.
- To prepare a map or plan to represent an area on a horizontal plan.
- To develop methods through the knowledge of modern science and the technology and use them in the field.
- To solve measurement problems in an optimal way.

LIST OF EXPERIMENTS

Chain Surveying

Ex.(i) (a) Ranging a line.

(b) Chaining a line and recording in the field book.

(c) Testing and adjustment of chain.

Ex.(ii) (a) Chaining of a line involving reciprocal ranging.

(b)Taking offsets and setting out right angles with cross staff and Indian optical square.

Ex.(iii) Chain survey of a small area.

Ex.(iv) Chaining a line involving obstacles in ranging.

Compass Survey

Ex. (v) (a) Setting the compass and taking observations.

(b) Measuring angles between the lines meeting at a point by prismatic compass.

Ex. (vi) Traversing with the prismatic compass and chain of a closed traverse. (Recording and plotting by included angles) Plate II

Setting a regular Pentagon of given side & bearing Plate III

Ex. (vii) Traversing with the Prismatic compass and chain of a closed and open traverse (Recording and plotting by deflection angles) Plate IV

Ex. (viii) Determination of local attraction at a station by taking fore and back bearing.

Ex. (ix) To find true bearing of a line at a place.

Leveling:

Ex. (x) To find the difference of level between two distant points by taking staff readings on different stations from the single setting.

Course Outcomes:

Students completing this course will be able to:

- To prepare a topographical map which shows the hills, valleys, rivers, villages, towns, forests, etc. of a country.
- To prepare a cadastral map showing the boundaries of fields, houses and other properties.
- To prepare an engineering map which shows the details of engineering works such as roads, railways, reservoirs, irrigation canals, etc.

- To prepare a military map showing the road and railway communications with different parts of a country. Such a map also shows the different strategic points important for the defense of a country.

Suggested Readings:

1. Punmia, B.C.: Surveying Volume I. Laxmi Publications.
2. Duggal, S. K.: Surveying Volume I. McGraw Hill.

Website Sources:

- https://www.slideshare.net

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -355: BUILDING MATERIAL LAB

Objective: The objective of this course is to familiarize the students with the study of different building material. Different test of cement, coarse aggregate, fine aggregate, and brick will be carryout.

I. Cement (Two turns only)

1. Normal Consistency of cement.
2. Initial & final setting time of cement
3. Compressive strength of cement
4. Fineness of cement by air permeability and Le-chatalier's apparatus.
5. Soundness of cement.
6. Tensile strength

II. Coarse Aggregate (Two turns only)

1. Crushing value of aggregate
2. Impact value of aggregate
3. Water absorption of aggregate
4. Sieve Analysis of Aggregate
5. Specific gravity & bulk density
6. Grading of aggregates.

III Fine Aggregate: (one turns only)

1. Sieve analysis of sand
2. Silt content of sand
3. Bulking of sand

IV Destructive and non-destructive testing on concrete.

V Bricks:

1. Water absorption.
2. Dimension Tolerances
3. Compressive strength
4. Efflorescence.

Course Outcomes:

Students complete this course will be able to:

- Concrete and it's different properties
- Manufacturing process of cement
- Test and classification of aggregate
- Mechanical properties of concrete
- Concrete mix design

Suggested Reading:

1. Neville A.M: Concrete Technology. Standard Publishers Distributors, Delhi
2. ShettyM.S: Textbook of Concrete Technology. S Chand Publication
3. Ramachandran V.S: Concrete Admixtures Handbook. Standard Publisher Distributors

Website Sources:

- http://ascelibrary.org/
- http://nptel.ac.in/noc
- https://www.iitk.ac.in/ce/test/IS-codes/is.12269.2013
- https://nptel.ac.in/courses/105/104/105104030/

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -401: BASIC GEOTECHNICAL ENGINEERING

Objective: Civil engineering projects such as buildings, bridges, earthen dams, and roadways require detailed subsurface information as part of the design process. The ground below us ultimately supports all structures and to be successful, the ground must not fail under the applied structural load.

UNIT I **(08 Sessions)**

Soil Formation: Origin of soil, formation of soil, weathering of rock and types of soils.**Soil Classification and Plasticity Characteristics of soil;**Particle size classification, Indian Standard Classification system, texture classification system, plasticity of soil, consistency limits, plasticity index, liquidity and consistency indexes.

UNIT II **(08 Sessions)**

Physical Properties: Constituents for soil, phase diagram for soil, definition and meaning of void ratio, porosity, degree of saturation, water content, air content, percentage of air voids, specific gravity of soil grains, unit weight.Weight simple numerical problems with the help of phase diagrams.

UNIT III **(10 Sessions)**

Permeability: Definition, Darcy's law, factor affecting permeability, permeability of stratified soils, and laboratory and field determination of coefficient of permeability.**Compaction;** Definition, different method of compaction, standard proctor test, factor affecting compaction, compaction equipment.**Consolidation;** Definition, its importance on foundation settlement, difference between compaction and consolidation.

UNIT IV **(06 Sessions)**

Effective Stress Principal Effective stress principal, nature of effective stress, effects of water table fluctuations of effective stress, seepage pressure, quick sand conditions.Shear strength, stress system with principal planes parallel to the coordinate axis, Mohr's circle, important characteristics of Mohr's circle, direct shear test, triaxial compression test.

UNIT V **(06 Sessions)**

Stability of Slopes: Types of slope failure, analysis of finite and infinite slopes in cohesion less and cohesive soil, Swedish and friction circle method, stability of slope under steady seepage condition.

Course Outcomes:

Students completing this course will be able to:

- To carry out Moisture content, Specific gravity, Atterberg limits tests.
- To carry out Grain size distribution, Proctor tests.
- To carry out unconfined compression, Triaxial tests.
- To carry out California Bearing Ratio, Vane Shear tests.

- To carry out Sand replacement, Core cutter, Permeability tests.

Suggested Readings:

1. Punamia, B.C.: Soil Mechanics and Foundations. Laxmi Publications (P) Ltd.
2. Arora, K.R.: Soil Mechanics and Foundations. Standard Publishers.

Website Sources:

- https://nptel.ac.in/
- https://en.wikipedia.org/wiki/Geotechnical_engineering
- https://civilenggforall.com/basics-of-geotechnical-engineering

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE 402: BASIC CONCRETE TECHNOLOGY

Objective: The objective of this course is to define and understand concepts related Concrete technology which involves types and property of concrete and different adhesive materials and its vital use for safe, economic development for the buildings

UNIT I **(10 Sessions)**

Introduction Definition of concrete, brief introduction to properties of concrete, advantages of concrete, uses of concrete in comparison to other building materials.**Cement Chemical**, composition of cement, process of manufacturing of cement, heat of hydration, hydration of cement, bogues compounds. Types of cements and its applications. Testing of cement

UNIT II **(06 Sessions)**

Aggregates: (i) Classification of aggregates according to source, size, and shape (ii) Characteristics of aggregates: Particle size and shape, crushed and rounded aggregates, surface texture, specific gravity of aggregate, bulk density, water absorption, surface moisture, bulking of sand, deleterious materials in the aggregate. (iii) Grading of aggregates, coarse aggregate, fine aggregate; All in aggregate; Fineness modulus.

UNIT III **(06 Sessions)**

Water & admixtures: Qualities of water, use of sea water for mixing concrete. plasticizers, super plasticizers, accelerators, retarders, air entraining agents, damp proofing, and water proofing. Fresh Concrete: workability, factors affecting workability, measurement of workability, segregation, bleeding, process of manufacturing of concrete.

UNIT IV **(08 Sessions)**

Strength of concrete: Water cement ratio, gel space ratio, gain of strength of age, maturity concept of concrete, relation between compressive and tensile strength. Elasticity, creep, and shrinkage: Elastic properties of aggregate, Relation between modulus of elasticity and strength, factor affecting modulus of elasticity, dynamic modulus of elasticity, poisons ratio. Creep, measurement of creep, factor affecting creep, effect of creep. Shrinkage: plastic shrinkage, drying shrinkage, factor affecting shrinkage

UNIT V **(12 Sessions)**

Concrete mix design: General, concept of mix design, variables in proportioning, various method of proportioning, statistical quality control of concrete, common terminologies, calculation of standard deviation and coefficient of variation, Relation between Average Design Strength and Specified Minimum Strength, Indian Standard Recommended Method of Concrete Mix Design**.** Special Concrete (i) Light weight concrete, Aerated concrete, No fines concrete, High Density concrete, fiber reinforced concrete, Polymer concrete.

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IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

Course Outcomes:

Students complete this course will be able to:

- Concrete and it's different properties
- Manufacturing process of cement
- Test and classification of aggregate
- Mechanical properties of concrete
- Concrete mix design

Suggested Reading:

1. Neville A.M: Concrete Technology. Standard Publishers Distributors, Delhi
2. ShettyM.S: Textbook of Concrete Technology. S Chand Publication
3. Ramachandran V.S: Concrete Admixtures Handbook. Standard Publisher Distributors

Website Sources:

- http://ascelibrary.org/
- http://nptel.ac.in/noc
- CivilDigital.com
- https://nptel.ac.in/courses/105/106/105106206/
- https://nptel.ac.in/courses/105/106/105106176/

Note: Latest editions of all the suggested readings must be used.

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -403: SURVEYING PRACTICE -II

Objective: The objective of this course is to familiarize the students with the development and plan process for any civil engineering project, at first field survey of that area is carried out and various type of survey maps are prepared. These maps and drawings are used for taking various decisions regarding the planning, designing, estimation, execution and construction process, etc. It also includes the study of field survey and the basic requirement for preparing any engineering maps or drawings.

UNIT I **(10 Sessions)**

Tachometric Surveying: Determination of constants of a tachometer, Determination of distance and elevation of a point by tachometers observations, Determination of gradient between two points of different elevations by stadia tachometry, tangential tachometric observation

UNIT II **(08 Sessions)**

Theodolite Survey: Use of theodolite, temporary adjustment, measuring horizontal and vertical angles, theodolite traversing

UNIT III **(10 Sessions)**

Survey adjustments: Errors - Sources, precautions, and corrections - Classification of errors - True and most probable values - Weighted observations - Method of equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.

UNIT IV **(08 Sessions)**

Curve surveying: Curves, types of curves, simple circular curves, compound curves, reverse curves, transition curves and vertical curve, sources of error setting of works

UNIT V **(04 Sessions)**

Hydrographic and advance surveying: Introduction to underground surveying, hydrographic surveying, photogrammetric surveying, remote sensing, and geographic information system

Course Outcomes:

Students completing this course will be able to:

- Handle various survey instruments for particular survey work.
- Carry out various civil engineering survey works.
- Collect and analyse survey data for preparing drawings and maps.
- Apply checks for error elimination.
- Calculate heights of different structures using appropriate instruments.
- Perform the setting of horizontal curves on the field.
- Carry-out survey work using a total station.

Suggested Readings:

1. Punmia, B.C.: Surveying Volume II. Laxmi Publications.
2. Duggal, S. K.: Surveying Volume II. McGraw Hill.
3. Basak, N. N.: Surveying &Levelling. Tata McGraw-Hill Education.

Website Sources:

- https://nptel.ac.in/courses/105/101/105101201/
- https://www.engineeringcivil.com/

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -404: INTRODUCTORY FLUID MECHANICS

Objective: The objective of this course is to familiarize the students with the behaviour of fluid flow in different conditions in pipes, channels, canals, notches, weirs etc. is necessary for civil, environmental and transportation engineers. It includes the basic knowledge about hydraulics which is useful in subjects like Irrigation, Water Resources Management and Public Health Engineering. In this course, basics of hydraulics and its application-oriented content has been kept with a focus that students should be able to solve practical problems.

UNIT I (10 Sessions)

Introduction: Definition of Fluids, types of fluids, properties of fluid (Mass density, specific weight, specific gravity, viscosity, surface tension - cohesion, adhesion, capillarity, vapour pressure and compressibility). Newton's Law of Viscosity, Types of Flow

UNIT II (08 Sessions)

Fluids Statics: Fluid pressure, Pascal's Law, pressure intensity and pressure Head. Derivation and Application of Basic Formula for pressure intensity. Types of hydraulic energy: Potential energy, kinetic energy, pressure energy, Bernoulli's theorem; statement and description (without proof of theorem)

UNIT III (06 Sessions)

Flow Measurements: Orifice (Definition and Types of Orifices, Hydraulic Coefficients) Venturimeter and mouthpiece (Definition and Types of Mouthpiece), Pitot tube, Current meters, Notches and weirs(Definition and types of Notches and Weirs. Discharge Formulae for Rectangular, Triangular and Trapezoidal Notch)

UNIT IV (06 Sessions)

Flow through Pipes: Definition of pipe flow; Reynolds number, laminar and turbulent flow - explained through Reynold's experiment, Critical velocity and velocity distributions in a pipe for laminar flow, Head loss in pipe lines due to friction, sudden expansion and sudden contraction, entrance, exit, obstruction and change of direction (No derivation of formula. Hydraulic gradient line and total energy line

UNIT V(10 Sessions)

Flow through open channels: Definition of an open channel, uniform flow and non-uniform flow, Discharge through channels using Chezy's formula and Manning's formula. Pump: Hydraulic pump, reciprocating pump and centrifugal pumps

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IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

Course Outcomes:

Students completing this course will be able to:

- Perform various tests regarding behaviour of fluid/liquid.
- Interpret the problems related to fluid/liquid and apply for solving fluid mechanics problem.
- Compute discharge and loss of head through pipes, open channels, notches and other hydraulic structures.

Suggested Readings:

- Fluid Mechanics and hydraulic machines by Dr. R.K. Bansal
- Modi P.N, and Seth SM, "Hydraulics and fluid mechanics" Delhi standard Publishers distributor.
- Khurmi R.S, " Hydraulics Machines" Delhi S. Chand and Co.

Website Sources:

- https://nptel.ac.in/

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -405: BASIC STRUCTURAL ANALYSIS

Objective: Civil engineering projects such as buildings, bridges, earthen dams, and roadways require detailed subsurface information as part of the design process. The ground below us ultimately supports all structures and to be successful, the ground must not fail under the applied structural load.

UNIT I **(06 Sessions)**

Structural Systems: Introduction, idealizations and assumptions, conditions of equilibrium, compatibility conditions, simple and compound systems, linear and non-linear systems.

UNIT II **(10 Sessions)**

Deflection of Beams: Moment area theorems, derivation of moment area theorems, calculation of maximum slope and deflection for the following standard cases of cantilever & simply supported beams due to point load & UDL.

UNIT III **(08 Sessions)**

Strain Energy: Strain energy and complementary strain energy, strain energy due to axial load, bending and shear, law of conservation energy, principle of virtual work, Castigliano's theorems.

UNIT IV **(08 Sessions)**

Rolling loads and influence lines for beams: Introduction, influence line diagrams, ILD for simply supported beams, cantilever beams, use of ILD.

UNIT V **(08 Sessions)**

Three Hinged Arches: introduction, three hinged arches, analysis for static loads, bending moment diagrams.

Course Outcomes:

Students completing this course will be able to:

- To know about the equilibrium equations.
- To use the method of section.
- To analysis the internal and external forces in a structure.
- To check the stability and unstability of the structure.

Suggested Readings:

1. Ramamrutham, S.: Theory of Structures. DhanpatRai Publishing Company.
2. Bhavikatti, S.S:StructuralAnalysis. Vikas Publishing House Pvt. Ltd

Website Sources:

- https://nptel.ac.in/
- https://sctevtservices.nic.in/

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -451: BASIC GEOTECHNICAL ENGINEERING LAB

Objective:

- To determine the distance and angle between different objects.
- To develop methods through the knowledge of modern science and the technology and use them in the field.
- To understand and experience experimental measurement of the physical and mechanical soil properties commonly used in engineering practice.
- To understand and be able to apply the modeling and analysis techniques used in soil mechanics: (a) Darcy's Law and flow-nets for seepage; (b) consolidation models for load-time-deformation responses of soils; (c) Mohr-Coulomb models for shear strength behavior of soils.

LIST OF EXPERIMENTS

1. Determination of natural moisture content.
2. Determination of specific gravity.
3. Determination of In-situ density by core cutter Method
4. Compaction test.
5. Grain size distribution of cohesionless soil by sieving.
6. Direct shear test.
7. Determination of compaction characteristics of soil by is light compaction
8. Determination of co-efficient of permeability by constant head permeameter (coarse grained soil)
9. Determination of co-efficient of permeability by variable head parameter (fine grained soil).
10. Determination of liquid limit (L.L) by Casagrandes.

Course Outcomes:

Students completing this course will be able to:

- Describe the nature of soil a problem encountered in civil engineering and gives an overall preview of the behavior of soil.
- Describes the nature of soil, especially the transmission of stresses between soil particles.
- Studying primarily the dry soil behavior since many aspects of soil behavior can be understood by considering the interaction of soil without the presence of water.

Suggested Readings:

1. Punamia, B.C.: Soil Mechanics and Foundations. Laxmi Publications (P) Ltd.
2. Arora, K.R.: Soil Mechanics and Foundations. Standard Publishers.

Website Sources:

- https://www.bitmesra.ac.in/UploadedDocuments/admincivil/files/smfe%20labs.pdf

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE- 452: CONCRETE TECHNOLOGY LAB

Objective: The objective of this course is to familiarize the students with the study of test of concrete. Different test of concrete in fresh and harden stage will be carryout

LIST OF EXPERIMENTS

1. To determine the physical properties of Cement as per BIS Codes
2. To determine flakiness and elongation index of coarse aggregates
3. Method to determine silt in fine aggregate
4. Determination of specific gravity and water absorption of aggregates
5. Determination of bulk density and voids of aggregates
6. Determination of particle size distribution of fine, coarse and all-in aggregate by sieve analysis (grading of aggregate)
7. To determine necessary adjustment for bulking of fine aggregate
8. To determine workability by slump test.

Course Outcomes:

Students complete this course will be able to:

- Concrete and it's different properties
- Manufacturing process of cement
- Test and classification of aggregate
- Mechanical properties of concrete
- Concrete mix design

Suggested Reading:

1. Neville A.M: Concrete Technology. Standard Publishers Distributors, Delhi
2. ShettyM.S: Textbook of Concrete Technology. S Chand Publication
3. Ramachandran V.S: Concrete Admixtures Handbook. Standard Publisher Distributors

Website Sources:

- http://ascelibrary.org/
- http://nptel.ac.in/noc
- CivilDigital.com

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -453: SURVEYING PRACTICE-II LAB

Objective: The objective of this course is to conduct experimentation for using different surveying instruments like total station, theodolite, auto level, global positioning system (GPS), geographical information system (GIS), electromagnetic distance measurement (EDM), plane table, compass, etc. Students learn to survey from conventional as well as contemporary methods and technology.

LIST OF EXPERIMENTS

1. Measurement of horizontal and vertical angles by theodolite
2. Traversing by theodolite
3. G.P.S (demonstration)
4. Setting out curves by different methods
5. Contouring
6. Total station (demonstration)

Course Outcomes:

Students completing this course will be able to:

- Have the fundamental knowledge to measure both horizontal distance and elevations without the use of sophisticated instruments.
- Have knowledge on the survey errors and its adjustments.
- Have knowledge to modern methods of surveying like Photogrammetry, Total station, and Hydrographic survey.

Suggested Readings:

1. Pant, M.K.: Laboratory Manual for Civil Engineering Students. S. K. Kataria& Sons.

Website Sources:

- https://www.youtube.com/watch?v=HGQM913rI10&list=PLkUEX3IbW7lclZ9jK-thjumHM2-meHGjF

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -454: FLUID MECHANICS LAB

Objective: The objective of this course is to conduct experimentation for

- Calibration of flow measuring devices
- Determination of friction factor for pipes
- Determination of minor losses in pipes
- Verification of Bernoulli's theorem.
- Studying the performance of hydraulic turbines and pumps

LIST OF EXPERIMENTS

1. Verification of Bernoulli's Theorem.
2. Determination of Cd of the given external cylindrical mouth-pieces
3. Determination of Cd the given triangular / rectangular notch
4. Determination of loss coefficient due to sudden expansion and sudden contraction for the given pipe arrangement
5. Determination of coefficient of friction for given pipe
6. Determination of meter coefficient (Cd) for the given Venturimeter / Orifice-meter
7. Viscosity determination by falling sphere viscometer
8. Study of the type of the flow by Reynolds apparatus
9. Determination of the efficiency of the given centrifugal pump

Course Outcomes:

Students completing this course will be able to:

- Calibrate flow measuring devices such as Venturimeter, orifice meter and v-notch
- Determine friction factor in pipes
- Determine minor losses in the pipes
- Verify Bernoulli's theorem.
- Understand the performance of hydraulic turbine and pumps under different working conditions

Suggested Readings:

1. Gupta, V.P.: Laboratory Manual of Fluid Mechanics and Machines. S. K. Kataria& Sons.

Website Sources:

- https://www.youtube.com/watch?v=HGQM913rI10&list=PLkUEX3IbW7lclZ9jK-thjumHM2-meHGjF

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -501: BASIC TRANSPORTATION ENGINEERING

Objective: The objective of this course is to familiarize the students with the knowledge and understanding of various aspects of highway geometrics, traffic engineering, different road materials, design of pavements, highway drainage, railway engineering, airport engineering, and docks and harbors in waterways engineering. It also includes the study about the aspects of roads, railways airways, and waterways to develop their understanding to apply their knowledge in improving civil infrastructure for transportation.

UNIT I (04 Sessions)

Introduction: Modes and development of traffic systems-their features and requirements. History of road development

UNIT II (10 Sessions)

Highways: Ideal road - alignment of highways- classification of highways- the concept of expressways- highway geometric and their standards: width elements, camber, gradient, superelevation and sight distance- highway materials, their requirements- bitumen- flexible and rigid pavements: water - bound macadam roads, blacktop roads, concrete roads, and their joints

UNIT III (10 Sessions)

Railways: Functions, requirements, and components of the permanent way - stations and yards - selection and requirements of the site, classification - working principle of simple turnout - signals and their classifications.

UNIT IV (10 Sessions)

Airports: Selection of site for an airport - elements and the typical layout of an airport - orientation, length, and patterns of runways - identification of runways (runway numbering) - parking of aircraft.

UNIT V(06 Sessions)

Docks and Harbors: Seaport: Selection of the site- elements and typical layout - functions, requirements, and classifications of docks and harbors - breakwater and their types dredging.

Course Outcomes:

Students completing this course will be able to:

- Know components parts of railway, bridges, tunnels, airport and dock and harbour engineering
- Understand methods of survey and investigation of alignment of railway, bridges, and tunnels.
- Organize, supervise and coordinate the construction activities related to railway, bridges, and tunnels

Suggested Readings:

1. Khanna, S. K., and Justo, C. E. G.: Highway Engineering. Nem Chand and Bros.
2. Saxena, S. C., and Arora, S. P.: A text book of Railway Engineering. Dhanpat Publications.
3. Rangwala, S.C., and Rangwala, P.S.: Airport Engineering. Charotar Publishing House Pvt. Limited.
4. Gautam, H. Oza, and Hasmukh, P. Oza: Dock and Harbour Engineering. Charotar Publishing House Pvt. Limited.

Website Sources:

- https://nptel.ac.in/
- https://www.courses.com/

Note: Latest editions of all the suggested readings must be used

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DCE -502: CONSTRUCTION MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT

Objective: The objective of this course is to familiarize the students with the construction works management and equipment used on the site. This consists study about the application of new construction activities and scheduling techniques, CPM & PERT.

UNIT I (04 Sessions)

Introduction and planning of civil engineering projects: Definition of construction management - Need for construction management - Scope of construction management. Preliminary planning - Factors to be considered - Reconnaissance survey - Preliminary survey - Analysis and plotting of data - Preliminary estimate - Project report - land acquisition - Administrative approval - Technical sanction - Budget provision.

UNIT II (12 Sessions)

Resource management - Optimum utilization of resources Finance, Materials, Machinery, Human resources, Labor legislation, Safety in Civil Engg. Works, Resource leveling, Resource scheduling. Construction Planning; Construction stages - Construction Operations - Construction Schedule - Materials - Equipment and Machinery - Labor - Programme and progress chart - Gantt chats - Uses and limitations.

UNIT III (08 Sessions)

Applications of Network Techniques: CPM and PERT networks- Advantages -Network concept - Activities -Dummy activities -Events -Networks Preparation -Numbering the Events -Time Estimates -Activity oriented time estimate -Event oriented time estimate -Floats -Project completion time and Critical path -Part - time estimates -Expected time -Standard deviation and variance - comparison between PERT and CPM -Network problems.

UNIT IV (08 Sessions)

Tenders and Documents: Tenders-Definitions -Sealed tender -Tender documents -Tender notice - Earnest money deposit -Security Deposit -Opening of tenders -Scrutiny of Tenders -Acceptance of Tenders -Works orders -Contract documents -Execution of agreement -General and specific conditions.**Contracts:** Contract system -Different types of contract -forms of contract -piece work agreement -A Lump sum contract -item rate or Unit price contract -cost plus percentage contract - merits and demerits -Negotiated rates -sub contract -procedure for enlisting of contracts -Legal implication of contract -Penalties and Arbitration.

UNIT V (08 Sessions)

Entrepreneurship and Finance: Definition and concept -role and significance -Risks and awards - profile and requirement of an entrepreneur development -Need for coordinated efforts -Follow up and institutional support needed -Programme Existing in India -SISI, DIC, TIIC, SIDCO –

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Assistance programs to entrepreneurs small business enterprises -forms of business enterprises -sole proprietorship -partnership -private limited company -public limited company -cooperative -state enterprises (Definition only) Role of Bank in the development of small business enterprises - Elements of cash flow -Cash inflow and cash outflow -cash flow diagram -time value of money - interest rate of capital -the present value of computation -calculation.

Course Outcomes:

Students completing this course will be able to:

- Gain the knowledge and understanding of construction works and its management on the field.
- Know about the construction planning, scheduling & controlling.
- Know about the material and labour management, equipment management, safety management, and disaster management.
- Appreciate the need for Entrepreneurship development in the context of Globalization and Liberalization and to develop entrepreneurial qualities.
- Understand financial and human resource management for an enterprise

Suggested Readings:

1. Chitkara, K.K.: Construction Project Management. McGraw Hill India.
2. Punmia, B.C.: Project Planning and Control with PERT and CPM. Laxmi Publications.
3. Sharma, S.C.: Construction Engineering & Management of Projects. Khanna Publishers.

Website Sources:

- https://nptel.ac.in/courses
- https://onlinecourses.nptel.ac.in
- https://www.youtube.com

Note: Latest editions of all the suggested readings must be used

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DCE 503: DESIGN OF CONCRETE STRUCTURES

Objective:

- To study the stress strain behavior of steel and concrete
- To understand the concept of working stress and limit state methods
- To gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage
- To understand the behavior of columns subjected to eccentric load and use of interaction diagrams
- To study the design of various foundation

UNIT- I **(10 Sessions)**

Introduction: Different grade of concrete and steel, I.S. specification, purpose of providing reinforcement, modular ratio, types of loads on structures as per IS:875. Design philosophies- working stress method, ultimate strength method and limit state method.

Singly Reinforced Rectangular Beams by WSM: Assumptions made in working stress method, permissible stresses, stress and strain distribution for rectangular section, actual and critical neutral axis, Under/ Over reinforced and Balanced section, Lever arm, Moment of Resistance. Analysis and design of singly reinforced beam section—by working stress method (Simple problems).

UNIT- II **(08 Sessions)**

Introduction to Limit State method: Different Limit States, characteristic and design strength of materials, characteristic loads, partial safety factor for loads and materials.

Singly Reinforced Rectangular Beams: Assumptions for limit states of collapse in flexure, stress strain relation for concrete and steel, maximum strain in concrete. Modes of failure- Under/ Over and Balanced section, mathematical derivation for moment of resistance, maximum and minimum reinforcement, effective span. Analysis and design of singly reinforced beam section- by limit state method.

UNIT- III **(06 Sessions)**

Doubly Reinforced Rectangular Beams: Introduction, stress in compression reinforcement, design steps, minimum and maximum reinforcement. Analysis and design of doubly reinforced beam section- by limit state method

UNIT- IV **(08 Sessions)**

Design of Shear & Development Length: Limit state of collapse in shear, design shear strength of concrete, design strength of vertical/ inclined stirrups and bent up bars in shear, principle of shear design, critical section for shear, nominal shear stress. Design of stirrups for simply supported/ cantilever rectangular and flanged beam. Anchorage and spacing of shear reinforcement. Development length, anchorage bond.

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UNIT V **(08 Sessions)**

Columns and Slab: Concept of long and short columns. IS specifications for main and lateralreinforcement. Behavior of RCC columns under axial load. Design of Axially loaded short andlong columns with hinged ends. Design of Isolated footing. **RCC slabs:** Structural behavior of slabs under UDL. Type of end supports. Design of one-way slab

Course Outcomes:

Students complete this course will be able to:

- Concept of reinforcement cement concrete
- Properties of different types of steel
- Limit and working stress method
- Singly and doubly reinforced beam section
- RCC slab design

Suggested Reading:

- Reinforced Concrete by A.K. Jain, Nem Chand & Bros, Roorkee
- Plain and Reinforce Concrete, Vol I by Jai Krishna and O.P. Jain, Nem Chand & Bros, Roorkee
- Limit state design by P.C. Varghese, Prentice Hall of India
- Plain and Reinforced Concrete- Code of Practice, IS: 456- 2000, Manak Bhawan, New Delhi
- Handbook on Concrete Reinforcement and Detailing, SP 34-1987, Amendment in March 1989

Website Sources:

- http://ascelibrary.org/
- https://nptel.ac.in/courses/105/105/105105104/
- https://nptel.ac.in/courses/105/105/105105105/

Note: Latest editions of all the suggested readings must be used.

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DCE -504: ESTIMATION & COSTING

Objective: Cost estimation enables the manufacturer to fix the selling price of a product well in advance of actual production. Cost estimation indicates to the manufacturer whether the contemplated programme of production and distribution will be economical or not. To determine whether the product and its parts can be manufactured economically in the plant itself or to be purchased from outside.

UNIT I **(08 Sessions)**

Introduction: Porous and importance of estimates- Principles of estimate-Types of estimates -Units of measurements - Methods of estimates -Specification, general and detailed-General items of work for estimates Units and measurement, method of accounting for the deduction no of openings etc.

UNIT II **(10 Sessions)**

Estimates: Preparing detailed estimates of various types of buildings, -R.C.C. works-earth work calculations for roads-estimating of culverts Services for building such as water supply-drainage and electrification.

UNIT III **(08 Sessions)**

Rate Analysis: Definition of analysis of rate-Prime cost- Work charged establishment- Quantity of materials per Unit of work for major civil engineering items- Resource planning through analysis of rates-market rates-Current schedule of rates. (C.S.R.)

UNIT IV **(08 Sessions)**

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

UNIT V **(08 Sessions)**

Specification and Tender: Data - Schedule of rates - Analysis of rates - Specifications - sources - Detailed and general specifications - Tenders - Contracts - Types of contracts - Arbitration and legal requirements.

Course Outcomes:

Students completing this course will be able to:

- Able to apply the basics of structural dynamics in analysis of structures subjected to earthquakes.
- Understand plate tectonics, ground motion magnitude, intensity, and frequency.
- Analyze earthquake characteristics and associated effects on structures, including linear and nonlinear responses.
- Able to apply the basic principles for seismic design and construction of structures in accordance with the provisions of International Building Codes.

Suggested Readings:

1. Dutta, B.N.: Estimating and Costing in Civil Engineering. UBS Publishers' Distributors Ltd.

Website Sources:

- https://nptel.ac.in/
- https://sctevtservices.nic.in/
- https://en.wikipedia.org/wiki/

Note: Latest editions of all the suggested readings must be used

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DCE -505: BASIC EARTHQUAKE ENGINEERING

Objective: The objective of this course is to provide coherent development to the students for the courses in the sector of earthquake engineering. This course includes the study of foundations of many basic engineering concepts related to earthquake engineering. This course gives experience in the implementation of engineering concepts that are applied in the field of earthquake engineering and involves the application of scientific and technological principles of planning, analysis, design of buildings according to earthquake design philosophy.

UNIT I **(10 Sessions)**

Introduction: Causes of earthquakes and seismic waves, magnitude, intensity, and energy release, Basic terminology, Characteristics of earthquakes, Seismic hazard, vulnerability and risk, Seismic Zoning. Earthquakes performance of structures in past earthquakes. Philosophy of earthquake-resistant design and concept of ductility, Short and long period structures, Concept of the spectrum, Static force calculations.

UNIT II **(08 Sessions)**

Architectural Considerations: Architectural Considerations: Architectural considerations: Building simplicity, symmetry. Irregularities, Continuity, and Uniformity, Effect of soils and liquefaction, Remedial measures, Construction of earth structures.

UNIT III **(10 Sessions)**

Seismic Construction:

Seismic construction of masonry buildings, precisions of IS: 4326.Seismic construction of RC buildings detailing, provisions of IS: 13920.

UNIT IV **(06 Sessions)**

Retrofitting: Retrofitting of masonry and reinforced concrete buildings.

UNIT V **(06 Sessions)**

Disaster Management: Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- It's objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benefit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination, and communication.

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Course Outcomes:

Students completing this course will be able to:

- To get a knowledge of earthquakes and its resistant features for different types of buildings.
- Able to design earthquake resistant structures as IS Codes.
- To acquire knowledge in knowing the performance of buildings under past earthquakes.
- To obtain skills in the field of repairing and retrofitting techniques.

Suggested Readings:

1. Sharma, Neelam: Earthquake Resistant Building Construction. S K Kataria& Sons.
2. Agarwal, Pankaj, and Shrikhande, Manish: Earthquake Resistant Design of Structures. PHI Learning Pvt. Limited.

Website Sources:

- https://nptel.ac.in/
- https://nptel.ac.in/courses/105/101/105101004/
- https://nptel.ac.in/courses/105/108/105108204/

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DCE -551: TRANSPORTATION ENGINEERING LAB

Objective: The objective of this course is to familiarize the students with the basic properties of bituminous & aggregate materials. It also includes the calculations of different materials required for concrete and bituminous mixes as per IS Code provisions.

LIST OF EXPERIMENTS

1. Crushing Value Test of Aggregate
2. Impact Value Test of Aggregate
3. Los Angeles Abrasion Value of Aggregate
4. Shape Test (Flakiness Index, Elongation Index) of Aggregate
5. Penetration Test of Bituminous Sample
6. Softening Point Test of Bituminous Sample
7. Stripping Test of Bituminous Sample
8. Ductility Test of Bituminous Sample
9. Flash & Fire Point Test of Bituminous Sample
10. California Bearing Ratio (CBR) test Apparatus

Course Outcomes:

Students completing this course will be able to:

- Evaluate the strength of subgrade soil by CBR test.
- Recognise the knowledge about different physical properties of aggregates by performing different test on road aggregates.
- Outline the various properties of bitumen material and mixes by performing various tests on it.

Suggested Readings:

1. Khanna, S. K., and Justo, C. E. G.: Highway Material Testing Laboratory Manual. Nem Chand and Bros.
2. Relevant IS Codes and IRC Codes.

Website Sources:

- https://www.researchgate.net/publication/309477120_Highway_Material_Testing_Manual

Note: Latest editions of all the suggested readings must be used

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DCE -552: CAD LAB -I

Objective: The objective of this course is to familiarize the students with the usage of Auto cad, the latest software, and basic drawing fundamentals in various civil engineering applications, especially in building drawings.

LIST OF EXPERIMENTS:

1. **Exercise-1**
   Starting AutoCAD-AutoCAD screen components-Starting a drawing: Open drawings, create drawings (Start from scratch, use a template & Use a wizard)-Invoking commands in AutoCAD-Drawing lines in AutoCAD-Co-ordinate systems: Absolute co-ordinate system, Relative co-ordinate system-Direct distance method-Saving a drawing: Save & Save As-Closing a drawing-Quitting AutoCAD
2. **Exercise-2**
   Draw Commands: ARC command-RECTANG command-ELLIPSE command, elliptical arc-POLYGON command (regular polygon)-PLINE command-DONUT command-POINT command-Construction Line: XLINE command, RAY command-MULTILINE command. UNDO / REDO commands-ZOOM command-PAN command, panning in real time-Setting Units-Object snap, running object snap mode-Drawing circles
3. **Exercise-3**
   Editing Commands: MOVE command-COPY command-OFFSET command-ROTATE command-SCALE command-STRETCH command-LENGTHEN command –TRIM command-EXTEND command-BREAK command-CHAMFER command-FILLET command-ARRAY command-MIRROR command –MEASURE command-DIVIDE command-EXPLODE command-MATCHPROP command-Editing with grips: PEDIT
4. **Exercise-4**
   Drawing Aids: Layers-Layer Properties Manager dialog box-Object Properties: Object property toolbar, Properties Window, Creating Text, Fundamental dimensioning terms: Dimension lines, dimension text, arrowheads, extension lines, leaders, centre marks and centrelines, alternate units-Associative Dimensions-Dimensioning Methods-Drawing leader. Inquiry Commands
5. **Exercise-5**
   Editing Dimensions, Hatching, Block, Plotting Drawings in AutoCAD: PLOT command-Plot Configuration-Pen Assignments-Paper Size & Orientation Area-Plot Rotation & Origin-Plotting Area-Scale
6. **Exercise-6**
   Draw working plan, elevation of Three bed room duplex bungalow with the given plot size
7. **Exercise-7**
   Draw working plan, elevation of Hostel building
8. **Exercise-**8
   Draw working plan, elevation of School buildings

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Course Outcomes:

Students completing this course will be able to:

- Use the AutoCAD commands for drawing 2D & 3D building drawings required for different civil engineering applications.
- Plan and draw Civil Engineering Buildings as per aspect and orientation.
- Presenting drawings as per user requirements and preparation of technical report.

Suggested Readings:

1. Sagar, Linkan: Auto CAD 2018 Training Guide. BPB Publications.
2. Tikku, Prof. Sham: Auto CAD 2020 Workbook. BPB Publications.

Website Sources:

https://www.youtube.com/watch?v=uy2GvFwVJU4&list=PL970B66C256FA05E1

Note: Latest editions of all the suggested readings must be used

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DCE -553: FIELD EXPOSURE

LIST OF EXPERIMENTS

1. Study of different types of building drawing.
2. Study of building components.
3. Study of various activities at construction site.
   Part (a): Foundation, Brickwork etc.
4. Study of various activities at construction site.
   Part (a): Scaffolding, Shuttering, Reinforcement.
5. Study of various activities at construction site.
   Part (a): Mixing, Casting etc.
6. Study of various activities at construction site.
   Part (a): Plastering, Curing etc.
7. Study of various equipment's used at construction site.
8. Visit of construction site outside university campus.

Suggested Readings:

1. Duggal, S.K.: Building Materials. New Age International Publishers.
2. Punmia, B.C.: Building Construction. Laxmi Publications.

Note: Latest editions of all the suggested readings must be used

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DCE -601: ENGINEERING GEOLOGY

Objective: The objective of this course is to familiarize the students with the study of Origin, Internal, and surface structures of the earth. It includes the study and identifies different types of natural materials like rocks (Igneous, Sedimentary, and Metamorphic), & minerals, and soil. It also includes the study of geological structures (Joint, veins, crack, faults, and fold), reasons for formation for each type, and their side effects on the engineering projects.

UNIT I (10 Sessions)
Minerals: Their physical and detailed study of certain rock - forming minerals. Rocks**:** Their origin, structure, Texture, and classification of igneous sedimentary and metamorphic rocks and their suitability as engineering materials.

UNIT II (10 Sessions)
Stratification: Lamination bedding. Outcrop-its relation to topography, dip, and strike of bed, overlap, outlier, and inliers. Rock deformation: Folds, Faults, joints unconformity and their classification, causes, and relation to engineering. The Behavior of rock masses.

UNIT III (08 Sessions)
Earthquake: its causes, classification, seismic zones of India, and Geological consideration for construction of a building projects in seismic areas. Landslides, its causes, classification, and preventive measures.

UNIT IV (08 Sessions)
Underground water: Origin, Aquifer, Aquicludes, Artesian Wells, underground provinces of India, and its role as a geological hazard. Building Stones Engineering., Properties of rocks, Alkali aggregate reaction, Grouting, Pozzolanic materials.

UNIT V (04 Sessions)
Geological investigations: Geological investigations for site selection of dams and reservoirs, tunnels, bridges, and highways.

Course Outcomes:
Students completing this course will be able to:

- The students will get basic knowledge about natural materials like rocks and minerals and their usage as well as their availability.
- Understand the weathering process and mass movement.
- Distinguish geological formations.
- Identify geological structures and processes for rock mass quality identify subsurface information and groundwater potential sites through geophysical investigations.
- Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels.

Suggested Readings:

1. Singh, Prabin: Engineering and General Geology. S.K. Kataria& Sons.
2. Bangar, K.M.: Principles of Engineering Geology. Standard Publishers Distributors.

Website Sources:

- https://nptel.ac.in/

Note: Latest editions of all the suggested readings must be used

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DCE -602: IRRIGATION ENGINEERING

Objective: The objective of this course is to familiarize the students with the basic concepts and design, planning, and management of irrigation & drainage systems and construction of various hydraulic structures.

UNIT I **(06 Sessions)**

Introduction:-Definition of irrigation, Necessity of irrigation, Types of irrigation, Methods of Irrigation.**Water Requirement of Crops:-**Duty, Delta and Base Period, their relationship, Gross command area, culturable command area, Intensity of irrigation, The water requirement of different crops of different seasons-Kharif, and Rabi.

UNIT II **(08 Sessions)**

Rain Fall & Run–Off: -Definition of rainfall & run-off, catchment area, Types of rain gauges - Automatic & Non -automatic.**Water Logging and Drainage:-**Definition, causes and effects, detection and remedies, Surface and sub-surface drains.

UNIT III **(10 Sessions)**

Lift Irrigation: Types of Wells - shallow & deep well, aquifer types, groundwater flow, the yield of an open/tube well. **Flow Irrigation**: Irrigation canals, Perennial Irrigation, Different Parts of irrigation canals and their functions, Design of irrigation canals -Chezy's formula, Manning's formula, Kennedy's and Lacey's silt theory and equations, critical velocity ratio. Various types of canal lining - Advantages & Disadvantages.

UNIT IV **(10 Sessions)**

Canal Head Works: Definition, object, general layout, functions of different parts, Difference between Weir and Barrage.**Regulatory Works:** Functions and explanation of terms used, Cross and Head regulators, Canal Falls, Outlets-Different types, Escapes.

UNIT V **(06 Sessions)**

Cross Drainage Works: -Functions and necessity of the following types: Aqueduct, Siphon, Super passage, Level crossing, inlet, and outlet.**Dams**: Types of dams, earthen dams-causes of failure, Gravity dams-elementary profile and stability criterion, Spillways.

Course Outcomes:

Students completing this course will be able to understand:

- Concepts of irrigation and different hydraulic structures.
- How to estimate the quantity of water required by crops.
- Be able to plan and design irrigation projects.
- Design channels and other irrigation structures required for irrigation, drainage, soil conservation, flood control, and other water-management projects.

Suggested Readings:

1. Modi, P.N.: Irrigation, Water Resources and Water Power Engineering. Standard Book House.
2. Garg, S.K.: Irrigation Engineering and Hydraulic Structures. Khanna Publishers.
3. Punmia, B.C. and Pande, B.B. Lal: "Irrigation and Water Power Engineering. Laxmi Publication

Website Sources:

- https://nptel.ac.in/

Note: Latest editions of all the suggested readings must be used

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DCE 603: ENVIRONMENTAL POLLUTION STUDIES

Objective: The main objective of this course is to evaluate the impact on environment that has occurred already with the following objectives:

- To assess the existing air quality.
- To assess the extent of pollution of water bodies due to developmental activities
- To assess the quality of soil and extent of soil pollution and soil degradation.

UNIT I **(08 Sessions)**

Impact of man on environment: atmosphere, biosphere, lithosphere, hydrosphere, hydrological cycle, nutrient cycles, food web, food chain, Energy in Ecosystem, Global environmental issues: Ozone depletion, global warming.

UNIT II **(08 Sessions)**

Air pollution: Introduction, classification of air pollution, causes of air pollution, effects of air pollution on human health, common air pollutants, control measures of air pollution, acid rain, The Taj mahal: A case study, air quality.

UNIT III **(08 Sessions)**

Water pollution: Introduction, Sources of water pollution, classification of water pollutants, control of water pollution, Dissolve oxygen, biochemical oxygen demand, five-day BOD, Effects of water pollution, wastewater treatment.

UNIT IV **(08 Sessions)**

Land pollution: Introduction, sources of land pollution, effects of land pollution, solid waste management- generation, storage, collection, transport, processing, and disposal.

UNIT V **(08 Sessions)**

Noise pollution: Introduction, Sources of noise pollution, effects of noise pollution, control measures for noise pollution, case study: Deepawali crackers noise

Course Outcomes:

Students complete this course will be able to:

- Hydrological cycle, Global environmental issues: Ozone depletion, global warming
- Classification of air pollution
- Classification of water pollutants, BOD, COD, DO
- Solid waste management
- Control measures for noise pollution

Suggested Reading:

1. Garg S. K: Environmental Engineering. Khanna Publication
2. DeswalSurinder. Energy: Environment Ecology and Society. Dhanpat and Co.
3. Rao C.S: Environmental Pollution Control Engineering. New Age International Publication

Website Sources:

- http://ascelibrary.org/
- http://nptel.ac.in/noc
- CivilDigital.com

Note: Latest editions of all the suggested readings must be used.

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DCE 604: INTRODUCTION TO BRIDGE ENGINEERING

Objective: The main objective of this course is to provide a basic knowledge of bridge and its components.

UNIT I **(10 Sessions)**

Bridge: Its Function and Component Parts, Difference between a Bridge and a Culvert, Classification of Bridges. Temporary Bridges: Necessity, Description with Sketches of Pontoon and Boat Bridges

UNIT II **(08 Sessions)**

Site selection: Factors Affecting the Selection of Site for a Bridge, Data to be Collected
Bridge Span: Economical Span and Factors Affecting It. Design Loads: Load Factors, Loads to Be Considered Including Wind and Seismic Loads, AASHTO Vehicle Loads, IRC Loading Standards

UNIT III **(08 Sessions)**

Piers: Definition, Parts, Types: Solid (Masonry and RCC), Open Cylindrical and Abutments Piers, Definitions of Following Terms: Height of Pier, Water Way (Natural and Artificial), Afflux and Clearance. Abutment and Wing Walls: Definition, Type of Abutments (Straight and Tee), Abutment with Wing Walls (Straight, Splayed, Return and Curve)

UNIT VI **(08 Sessions)**

Bridge bearing: Purpose of Bearing, Types: Fixed Plate, Sliding Plate, Deep Cast Base, Rocker and Roller Bearing, Their Functions with Sketches Foundation: General Aspects, Types of Foundation: Pile Foundation, Well Foundation, Caisson Foundation

UNIT V **(06 Sessions)**

Reinforced concrete bridges: Advantages, Types Pre-stressed Concrete Bridges: Advantages, Types Steel Bridges: Advantages, Types Maintenance of Bridges: Inspection of Bridges, Routine Maintenance

Course Outcomes:

Students complete this course will be able to:

- Bridge: Function and Component Parts
- IRC Loading Standards
- Piers: classification and different components
- Maintenance of Bridges: Inspection of Bridges, Routine Maintenance

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Suggested Reading:

1. Raju N.K: Design of Bridges. Oxford & IBH Publishing Co. Pvt. Ltd.
2. Victor D.J: Essentials of Bridge Engineering. Publishing Co. Pvt. Ltd

Website Sources:

- http://ascelibrary.org/
- http://nptel.ac.in/noc
- CivilDigital.com
- https://nptel.ac.in/courses/105/105/105105165/

Note: Latest editions of all the suggested readings must be used

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DCE -605: DESIGN OF STEEL STRUCTURES

Objective:

- To provide the students the tools necessary for designing steel structures
- To familiarize the students with international design codes.
- To provide an understanding of Load from Allowable Stress Design (ASD).

UNIT I **(08 Sessions)**

Structural Steel and Sections: Properties of structural steel as per IS: 226 and IS: 197. Designation of structural steel sections as per IS handbook and IS:800. Concept of determinate and indeterminate structures

UNIT II **(12 Sessions)**

Structural Steel Connections:

i. Riveted connections - types of rivets, permissible stresses in rivets. Types of riveted joints, Failure of riveted joints, Assumptions made in the design of riveted joints. Specification for riveted joints. Design of riveted joints for axially loaded members.

ii. Welded Connections- comparison between riveted and welded joints, types of welds, permissible stresses in welds, types of welded connections, strength of welded joint.

iii. Bolted Connections

UNIT III **(08 Sessions)**

Tension Members: Forms of common sections. Permissible Stresses in tension for steel. Strength of a tension member. Design of tension members (flats, angles & Tee Sections only). Tension splice and their design.

UNIT IV **(08 Sessions)**

Compression Members: Design of struts and columns as per IS: 800. Effective length, slenderness ratio and permissible stresses, simple and built-up sections, concept of lacings in built up columns. Column bases, design of simple column base.

UNIT V **(06 Sessions)**

Beams: Design criteria, allowable stresses, Design of laterally restrained beams including simple built-up sections. Checks for web bulking, web crippling and deflection.

Course Outcomes:

Students completing this course will be able to:

- Able to design various huge steel structures in the field of civil engineering works.
- Able to understand properties of steel under loading conditions.
- Able to determine the ultimate bending moment capacity of steel members considering both yielding and lateral buckling.
- Ability to analyze Railway Bridge, footbridge and industrial sheds.

Suggested Readings:

1. Duggal, S.K.:Design of Steel Structures.Tata McGraw-Hill Education.
2. Negi, L.S.: Design of Steel Structures. McGraw Hill India.

Website Sources:

- https://nptel.ac.in/
- https://sctevtservices.nic.in/
- https://en.wikipedia.org/wiki/
- https://nptel.ac.in/courses/105/106/105106112/

Note: Latest editions of all the suggested readings must be used

UNIVERSITY POLYTECHNIC
DEPARTMENT OF CIVIL ENGINEERING
IFTM UNIVERSITY, MORADABAD

Diploma (Civil Engineering)

DCE -651: ENGINEERING GEOLOGY LAB

Objective:

- To understand the role of geology in the design and construction process of underground openings in rock.
- To apply geologic concepts and approaches on rock engineering projects.
- To identify and classify rock using basic geologic classification systems.
- To use the geologic literature to establish the geotechnical framework needed toϖ properly design and construct heavy civil works rock projects.
- To identify and characterize intact rock/rock mass properties.

LIST OF EXPERIMENTS

1. Identification of minerals based on their physical properties- five samples.
2. Identification of rocks based on their physical properties- five samples.
3. To draw contour patterns of hills, valleys, rivers, plateau, saddle, topographic basin etc.
4. To draw geological section from the given map.
5. To determine the strike & dip of rock formation.
6. To determine the thickness of beds of the geological formation.

Course Outcomes:

Students completing this course will be able to:

- Ability to categorize rocks and minerals by their origin and engineering properties.
- Ability to apply geological principles to rock masses and discontinuities for use in engineering design e.g., rock slopes, foundation.

Suggested Readings:

1. Singh, Prabin:Engineering and General Geology. S.K. Kataria& Sons.
2. Bangar, K.M.: Principles of Engineering Geology.Standard Publishers Distributors.

Website Sources:

1. http://202.53.81.85/autonomus14/21/CIVIL/CE3L2.pdf
2. https://www.nitw.ac.in/media/Scheme&Syllabus-2014/B.Tech-Civil-Syllabus_new.pdf

Note: Latest editions of all the suggested readings must be used

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Diploma (Civil Engineering)

DCE -652: CAD LAB -II

Objective: The objective of this course is to familiarize the students with the usage of the various advanced software (such as STADD PRO) of civil engineering for the purpose of designing the various components of a structure.

Exercise-1: Isometric Drawing by CAD using any part modelling Software (3D)
Drawings of following on computer: Cone, Cylinder, Cube, Spring, Isometric view of objects

Exercise-2: Part modelling
Part Modelling Tools: -

- Creating reference planes
- Creating Extrude features Creating Revolve Creating Swept features
- Creating Loft features
- Creating Reference - points, axis, coordinates
- Creating curves
- Creating Fillet features
- Inserting Hole types
- Creating Chamfer
- Creating Shell
- Creating Rib

Exercise-3
Preparation of drawings using Cad Software (3D)
Structural Engineering (Any 4)

- Singly reinforced rectangular beam
- Doubly reinforced Continuous beam (Rectangular beam with two spans)
- Tee Beams supporting continuous slab
- Continuous one-way slab (with three equal spans)
- Simply supported two-way slab
- Restrained two-way slab
- Lintel and Sunshade
- Dog-legged staircase
- R.C.C. Column with square isolated footings

Bridge Drawing
Draw plan and sectional views of the following

- Steel Foot over bridge across a highway
- Two span Tee Beam Bridge with square returns

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Course Outcomes:

Students completing this course will be able to:

- Produce structural drawing of Reinforced Concrete Elements such as Beams, Slabs
- Develop Structural Drawings of steel elements such as Connections, Tension Members, Compression Members, Beams, Column Base, and Roof Trusses.
- Understand various connection details.

Suggested Readings:

1. Introduction to Auto CAD 2019, 2D and 3D design by Alf Yarwood, Auto Desk

Website Sources:

- https://www.sseacademy.com/

Note: Latest editions of all the suggested readings must be used

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DCE -654: CIVIL ENGINEERING DRAWING LAB

Objective: The objective of this course is to familiarize the students with the basic concepts about civil engineering and the drawing regarding residential and public building.

LIST OF EXPERIMENTS

1. Section A

Introduction: Drawing Instrument & their use, Types of lines & letters. Scales, Projection, Dimensions & their types, planning of a sheet, and Types of Engineering Drawings.

2. Section B

Building Drawings: Building symbols .and Types of building drawings, proposed drawing, submission drawing, working drawing & completion drawing.

3. Section C

- **Drawing I:** Details of spread footing foundations for load-bearing and no-load bearing wall for a given thickness of walls with the help of given data or rule of the thumb, showing offsets, the position of DPC; Details of basement showing necessary damp proofing. Detail of cavity wall.
- **Drawing II:** Plans of T corner junction of walls 1 brick, 1-1/2 brick, and 2 brick thick in English and Flemish bonds brick pillars.

4. Section D

- **Drawing III:** Elevation, sectional plan and sectional side elevation of paneled and glaze the door flush door, steel windows and aluminum window.
- **Drawing IV:** Drawing plan, the elevation of a small building by measurement.

5. Section E

- **Drawing V:** The detailed plan, elevation and section of a two - bedroom residential building from a given line plan, showing details of foundations, roof and parapet.
- **Drawing VI:** Detailed working drawing of a small double - storey building on a given plot, keeping in view building eye laws, showing sloping roof or surface drainage plan and flooring details.

Reference Books:

2. Civil Engineering Drawing by J.S. Layal, Satya Prakashan, New Delhi
3. Civil Engineering Drawing by V.B. Sikka, S. K. Kataria & Sons, New Delhi
4. Introduction to Auto CAD 2011, 2D and 3D design by Alf Yarwood, Auto Desk

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Diploma (Civil Engineering)

Course Outcomes:

Students completing this course will be able to:

- Explain Building bye - laws and Principles of Planning for residential and public buildings.
- Prepare a detailed drawing for residential and public buildings.
- Interpret conventional signs, symbols, and working drawings of various civil engineering structures.
- To prepare a detailed drawing of residential and public buildings.
- To prepare perspective view of a given building.

Suggested Readings:

- Civil Engineering Drawing by J.S. Layal, Satya Prakashan, New Delhi
- Civil Engineering Drawing by V.B. Sikka, S. K. Kataria & Sons, New Delhi
- Handbook on Concrete Reinforcement and Detailing, SP 34-1987, Amendment in March 1989

Website Sources:

- https://www.youtube.com/watch?v=pdbQvIbGd_4

Note: Latest editions of all the suggested readings must be used