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
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Study & Evaluation Scheme of
Diploma (Computer Science & Engineering)
[Session 2020-21]

Programme: Diploma (Computer Science & Engineering)
Course Level: Diploma
Duration: Three Years (Six Semesters) Full Time
Medium of instruction: English/Hindi
Minimum Required Attendance: 75%
Maximum Credits: 150

Programme Outcomes (Pos):

Students completing this programme will be able to:
- An ability to apply knowledge of computing and mathematics appropriate to the discipline.

- Analyze a computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

- An ability to lay strong foundation of innovative learning and creative ideas.

- Apply computer science theory and software development fundamentals to produce computing based solutions.

- An ability to function on multi-disciplinary teams.

- An understanding of professional and ethical responsibilities for the computing profession.

- An ability to analyze impacts of computing on individuals, organizations, and society.

- An ability to use appropriate techniques, skills, and tools necessary for computing practice.

- An ability to apply design and development principles in the building of software systems.

- An ability to communicate effectively.

Diploma (Computer Science & Engineering)
YEAR I, SEMESTER-I

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
			L	T	P	Mid Term Exam			External Exam		
						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	**Fundamentals of English Communication** / Computer fundamentals & 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 and Electronics Engineering Lab	0	0	2	-	-	30	70	100	1
11.	DGP -101	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

YEAR I, SEMESTER-II

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
			L	T	P	Mid Term Exam			External Exam		
						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	Fundamentals of English Communication /**Computer fundamentals & 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 and 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**	**-**	**-**	**-**	**-**	**1100**	**29**

Diploma (Computer Science & Engineering)
Year –II Semester-III

S.No.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
						Mid Term Exam			External Exam		
			L	T	P	CT	AS +AT	Total	Exam		
THEORY											
1.	DCS-301	Basic Digital Electronics	3	1	0	20	10	30	70	100	4
2.	DCS-302	Introduction to Data Structure and Algorithm	3	1	0	20	10	30	70	100	4
3.	DCS-303	Basic Object-Oriented Concepts & C++	3	1	0	20	10	30	70	100	4
4.	DCS-304	Computer Application Software Packages	3	1	0	20	10	30	70	100	4
5.	DHU-301	Organizational Behavior	3	1	0	20	10	30	70	100	4
PRACTICALS / SEMINARS / PROJECT											
6.	DCS-351	Digital Electronics Lab	0	0	2	-	-	30	70	100	1
7.	DCS-352	Data Structure Lab	0	0	2	-	-	30	70	100	1
8.	DCS-353	C++ Lab	0	0	2	-	-	30	70	100	1
9.	DGP-301	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**15**	**05**	**06**	**-**	**-**	**-**	**-**	**900**	**24**

Year –II Semester-IV

S.No.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
						Mid Term Exam			External Exam		
			L	T	P	CT	AS +AT	Total	Exam		
THEORY											
1.	DCS-401	Introduction to Computer Network	3	1	0	20	10	30	70	100	4
2.	DCS-402	Introduction to Database Management System	3	1	0	20	10	30	70	100	4
3.	DCS-403	Introduction to Operating System	3	1	0	20	10	30	70	100	4
4.	DCS-404	Introduction to Management Information System	3	1	0	20	10	30	70	100	4
5.	DCS-405	Basics of Computer Organization	3	1	0	20	10	30	70	100	4
PRACTICALS / SEMINARS / PROJECT											
6.	DCS-451	Computer Network Lab	0	0	2	-	-	30	70	100	1
7.	DCS-452	DBMS Lab	0	0	2	-	-	30	70	100	1
8.	DCS-453	Operating System Lab	0	0	2	-	-	30	70	100	1
9.	DGP-401	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**15**	**05**	**06**	**-**	**-**	**-**	**-**	**900**	**24**

Diploma (Computer Science & Engineering)
Year –III   Semester-V

S.No.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
						Mid Term Exam			External		
			L	T	P	CT	AS +AT	Total	Exam		
THEORY											
1.	DCS-501	System Administration	3	1	0	20	10	30	70	100	4
2.	DCS-502	Java Programming	3	1	0	20	10	30	70	100	4
3.	DCS-503	Computer Graphics & Multimedia	3	1	0	20	10	30	70	100	4
4.	DCS-504	Introduction to Software Engineering Principles	3	1	0	20	10	30	70	100	4
5.	DCS-505	Web Designing	3	1	0	20	10	30	70	100	4
PRACTICALS / SEMINARS / PROJECT											
6.	DCS-551	System Administration Lab	0	0	2	-	-	30	70	100	1
7.	DCS-553	Computer Graphics Lab	0	0	2	-	-	30	70	100	1
8.	DCS-555	Web Designing and Java Lab	0	0	2	-	-	30	70	100	1
9.	DGP-501	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**15**	**05**	**06**	**-**	**-**	**-**	**-**	**900**	**24**

Year –III   Semester-VI

S.No.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
						Mid Term Exam			External		
			L	T	P	CT	AS +AT	Total	Exam		
THEORY											
1.	DCS-601	.Net Programming	3	1	0	20	10	30	70	100	4
2.	DCS-602	Computer Hardware Maintenance	3	1	0	20	10	30	70	100	4
PRACTICALS / SEMINARS / PROJECT											
3.	DCS-651	.Net Programming Lab	0	0	2	-	-	30	70	100	1
4.	DCS-652	Computer Hardware Maintenance Lab	0	0	2	-	-	30	70	100	1
5.	DCS-653	Industrial Training Viva & Seminar *	0	0	4	-	-	100	-	100	3
6.	DCS-654	Major Project	0	0	4	-	-	50	250	300	6
7.	DGP-501	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**06**	**02**	**12**	**-**	**-**	**370**	**530**	**900**	**20**

* Industrial training must be done after IV Semester.

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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.

UNITI   (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.

UNITII   (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-DeskJet, Laser Printer, Thermal Transfer Printer, Barcode Printers, Electro static printers and plotters, High Level Language and Low-Level Language, Firmware, Compiler, Interpreter and Assembler.

UNITIII   (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, getchar(), Putchar(), scanf, printf, 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.

UNITIV   (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.

UNITV   (08Sessions)
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.

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)
3. Programming in Ansi C E. balagurusamy (3rd edition Mc Graw Hill)

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/

IFTM University, Moradabad
Diploma(Computer Science and Engineering) Programme
Diploma(CS&E) I Year (I/II Semester)

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

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)
3. Programming in Ansi C E. balagurusamy (3rd edition Mc Graw Hill)

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/

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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.

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

Website Sources:

- ➢ https://thefactfactor.com
- ➢ https://i1.dainikbhaskar.com
- ➢ https://hplgit.github.io
- ➢ https://worldwidescience.org
- ➢ https://courses.lumenlearning.com
- ➢ https://www.machinedesign.com
- ➢ http://teacher.pas.rochester.edu

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 Poissuille 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 (BhartiBhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (BhartiBhawan)
3. A Text Book of Applied Physics: EgaleParkashan, Jullandhar

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

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 ConductorPhysics: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 (BhartiBhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (BhartiBhawan)
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
- https://www.toppr.com
- https://opentextbc.ca
- https://www.askiitians.com/
- https://www.askiitians.com

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 (BhartiBhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (BhartiBhawan)
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

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 reacrants 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

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

Website Sources:
- ❖ http://www.commonchemistry.org/
- ❖ https://uri.idm.oclc.org/login?url=https://www.engineeringvillage.com/search/quick.url? CID=quickSearch&database=1
- ❖ https://www.technicalsymposium.com/

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

DCH -151: Chemistry- Lab I
(20 sessions)

Objectives: Practical implementation of fundamental concepts of qualitative and quantitative analysis. Student will gain 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.

PRACTICALS

1. To analyse 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 analyse 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.: 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

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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, Green house 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

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 Polymerisation.
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:
- ❖ 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)
- ❖ Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.

Website Sources:
- ❖ http://www.commonchemistry.org/
- ❖ https://uri.idm.oclc.org/login?url=https://www.engineeringvillage.com/search/quick.url? CID=quickSearch&database=1
- ❖ https://www.technicalsymposium.com/

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

DCH -251: Chemistry-II Lab

(20 Sessions)

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.

PRACTICALS

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:
6. Applied Chemistry by R. S. Katiyar& J.P. Chaudhary Publication B.B.P. & Co. Meerut
7. March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure Smith, Michael B./March, Jerry, John Willey & sons, 6th Edition, 2007.
8. Elements of Physical Chemistry, Glasstonne, Samuel B. ELBS, 2005.
9. Organic Chemistry, Finar, I.L.: Addision – Wesley Longman, Limited, 2004.
10. 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

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 – 1
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 – 2
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 – 3
Vector algebra: Dot and Cross product, Scalar and vector triple product, Application to work done, Moment of a force.
UNIT – 4

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 – 5
Complex numbers, Representation, Modulus and amplitude De-moiver'stheorem 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 inalgebra, 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 inalgebra, determinants,vectors, trigonometry and complex numbers.

Suggested Readings:
1. R.D. Sharma: Mathematics (I& II-XI) [DhanpatRai Publication, Delhi.]
2. B.S. Grewal :Engg. Mathematics by [khanna Publishers, New Delhi.]
3. H.R. Luthra : Applied Mathematics:[Bharat BhartiPrakashan& Co. Meerut]
4. KailashSinha : 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
- en.wikipedia.org

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 – 1
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 – 2
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 – 3
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 – 4

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

UNIT – 5
CO-ORDINATE GEOMETRY: Standard form of curves and their simple properties-Parabola Ellipse, Hyperbola, Tangent and normals, 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 CalculusandCoordinate Geometry.
• Students will be able to understand and interpret the concepts of differential, integral CalculusandCoordinate Geometry.
• Students will be able to compare and analyse the methods in differential, integral CalculusandCoordinate Geometry.
• Students will be able to predict and evaluate the problems indifferential, integral CalculusandCoordinate Geometry.

Suggested Readings:
1. R.D. Sharma: Mathematics (I& II-XI) [DhanpatRai Publication, Delhi.]
2. B.S. Grewal :Engg. Mathematics by [khanna Publishers, New Delhi.]
3. H.R. Luthra : Applied Mathematics:[Bharat BhartiPrakashan& Co. Meerut]
4. KailashSinha : 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
- en.wikipedia.org

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 1.(8 sessions)

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

Unit 2.(8 sessions)

System of Forces: Concept of co-planer and non-co-planer forces including parallel forces. Concurrent and non-concurrent forces.Resultantforce.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 3.(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 4.(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 5.(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

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 1.(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, Rivetting, Fitting and Plumbing.

Unit 2.(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 3.(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 4.(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.

Unit 5.(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 (DhanpatRai& 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

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

DME -151: Engineering Drawing Lab

Objective:

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

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 inclind to the others plane, true shape of the section(**1 Sheet)**

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

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 DrawingbyR. 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

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 operationsused for various machining.
4. To develop a knowledge of workshop practice and basic use of machine tools and workshop equipment..

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 briddle 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.

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 hexogonalhead 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 TechnologybyRajender Singh

Website Sources:

- https://www.abebooks.com/servlet/BookDetailsPL?bi=30061491479&cm_sp=rec-_-pd_hw_i_1-_-bdp&reftag=pd_hw_i_1
- https://www.google.co.in/books/edition/Introduction_to_Basic_Manufacturing_Proc/ky7r-BclY8cC?hl=en&gbpv=1&pg=PP1&printsec=frontcover

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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 1. (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 2. (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 3. (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 4. (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.

Unit 5.   **(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

https://khannapublishers.in/index.php?route=product/category&path

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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.

UNITI   **(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: Kirchoff'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 fieldintensity, 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.
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-AshfaqHussain, DhanpatRai& 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
- https://nptel.ac.in/courses/108/108/108108076/

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

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:

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, KVLand 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
- www.digitalelectronicsforstudents.files.wordpress.com
- www.mist.ac.in
- www.educompijre.files.wordpress.com

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) I Year (I/II Semester)

Fundamentals of English Communication (FEC-101/FEC-201)

Credit: 04

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: Basic Applied Grammar and Usage   (06 Sessions)
        The Sentences: Kinds of Sentences; Subject and Predicate
        Phrases & Clauses, Idioms & Proverbs

UNIT II: Basic Applied Grammar Continued   (08 Sessions)
        Nouns: Kinds; Singular/Plural; Gender; Possession
        Pronouns: Kinds; Usage
        Adjectives: Kinds; Degrees of Comparison; Usage
        Determiners: Kinds, Usage of Adjectives and Determiners

UNIT III: Basic Applied Grammar Continued   (08 Sessions)
        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: Basic Applied Grammar Continued   (06 Sessions)
        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: Comprehension and Précis Writing (10 Sessions)
    Reading Comprehension
        Précis Writing:Techniques of Précis Writing and Exercises
        Formal Letter Writing:Leave Application (for different reasons), Application for Fee
            Concession
        andInvitation (for family and friends)

Suggested Readings:

    (1) Professional Communication by MaltiAgarwal, 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.

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (III Semester)

DCS 301: Basic Digital Electronics

Objective: The objective of this course is that students will learn and understand the Basics of digital electronics and able to learn the basics of gates and design basic logic circuits, combinational and sequential circuits.

UNIT I (10 Sessions)
Data and number systems, Binary representation, codes and their conversions: BCD, Octal, Hexadecimal, Gray, Signed binary number representation with 1's and 2's complement methods.

UNIT II (10 Sessions)
Binary arithmetic Boolean algebra, logic gates and circuits, Minimization of logic expressions by algebraic method, K-map method.

UNIT III (09 Sessions)
Combinational circuits:adder, subtractor, encoder, decoder, comparator, multiplexer, de-multiplexer, parity generator, Design of combinational circuits-Programming logic devices.

UNIT IV (08 Sessions)
Flip Flops, various types of Registers and counters and their design, sequential circuits**.**

UNIT V (07 Sessions)
Memory devices:ROM,RAM, EPROM, EEPROM, etc Different types of A/D and D/A conversion techniques.

Course Outcomes:
Students completing this course will be able to:
- Learn number system and their conversion.
- Design and learn the basics of gates.
- Design and learn simple logic circuits and various registers.
- Apply Boolean laws to simplify the digital circuits.
- To understand the basic digital circuits and to verify their operation.

Suggested Readings:
1. Givone: digital Principles & design, TMH
2. Digital Electronics – Dr. Saroj Rangnekar, ISTE/EXCEL BOOKS
3. Malvino: Digital Principles & application TMH
4. Jain: Modern Digital Electronics 2/e TMH
5. Marcovitz: Intro to logic Design Tata Mcgraw-hill
6. Digital Integrated Electronics- H.Taub&D.Shilling, Mc Graw Hill
7. Digital Technology- Virendra Kumar, New Age

Website Sources:

- onlinecourses.nptel.ac.in
- en.wikipedia.org
- electronics-course.com
- www.coursera.org
- www.electronics-tutorials.ws

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (III Semester)

DCS 302: Introduction to Data Structure and Algorithm

Objective: The objective of this course is to introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.

UNIT I (10 Sessions)
Introduction: Basic Terminology, Elementary Data Organization, Data Structure operation, Algorithm, Complexity of Algorithm, Abstract Data Type
Arrays: Introduction, Linear Arrays, Representation of array in memory, Insertion and Deletion in array, Multidimensional Arrays
Linked lists: Introduction, Representing of Linked Lists in Memory, Implementation of Singly Linked Lists, Doubly Linked List.

UNIT II (10 Sessions)
Stacks: Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack, Application of stack.
Queues: Representation of Queue, Operations on Queue: Create, Add, Delete, Full and Empty, Linked representation of queues, Circular queues, Dequeue

UNIT III (07 Sessions)
Tree: Definitions and Basic Concepts of Binary Tree, Representations of binary tree in memory, Binary Tree Traversal algorithms and their Applications.

UNIT IV (08 Sessions)
Graphs: Terminology, Sequential and Linked Representations of Graphs: Adjacency Matrices, Adjacency List, Graph Traversal: Depth First Search and Breadth First Search.

UNIT V (07 Sessions)
Sorting: Introduction, Sorting, Insertion Sort, Selection Sort, Merge Sort, Bubble Sort.

Course Outcomes:
Students completing this course will be able to:
- To learn and understand the basic features of data structure.
- Describe how arrays, stacks, queues, trees, and graphs are represented in memory and used by the algorithms.
- Demonstrate different methods for traversing trees.
- Design algorithms to perform operations with Linear and Nonlinear data structures.
- An understanding of the basic search and sort algorithms.

Suggested Readings:
1. Schaum's Outlines Data structure Seymour Lipschutz Tata McGraw Hill 2nd Edition

2. Data structures & Program Design in C Robert Kruse, C.L.Tondo, Bruce Leung Pearson
3. Data structure using C AM Tanenbaum, Y Langsam& MJ Augustein, Prentice Hall India
4. Data structure – A Pseudocode Approach with C – Richard F Gilberg Behrouz A. Forouzan, Thomson

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com/data_structures_algorithms/
- www.studytonight.com
- www.geeksforgeeks.org

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (III Semester)

DCS 303: Basic Object Oriented Concepts & C++

Objective: The objective of this course is to provide complete knowledge of Object-Oriented programming concepts and their implementation and to enhance the programming skills by giving practical assignments to be done in labs.

UNIT I   (10 Sessions)
Introduction: C++ character set, Keywords, Input-Output operator, Role of compiler, Data types, Variables & Constants, Local & global variables. Operators: Arithmetic, Unary, Binary, Increment & Decrement, Logical. Jump statements: Goto, Break, Continue, and Exit.

UNIT II   (10 Sessions)
Conditional Statements: If-else, Nested if, Else-if, Switch-case. Iteration statements: For loop, While loop, Do-while loop. Arrays: Definition, Need of arrays, Initialization, Implementation. Functions: Definition, Use, Prototype, Call by value, Call by reference, Return statement.

UNIT III   (06 Sessions)
Pointers: Definition, Memory allocation, Declaration, Application. Structures: Definition, Uses, Declaration, Advantages and Disadvantages.

UNIT IV   (08 Sessions)
Concept of Object oriented programming: Data Abstraction, Data Hiding, Data Encapsulation, Class & Object, Abstract Class, Polymorphism, Inheritance, and Advantages of OOP over earlier programming methodologies.

UNIT V   (08 Sessions)
Inheritance: Concept, Base Class, Derived Class, Defining derived class, Types: Single, Multiple, Multilevel, Members, Accessibility of members, Mode of Inheritance.

Course Outcomes:
Students completing this course will be able to:
- Understand the features of C++.
- Learn Object-Oriented concepts and their implementation.
- Understand advanced features of C++.
- Analyze a given problem and construct a C++ program that solves it.

Suggested Readings:
1. Sumita Arora, "Computer Science using C++", Dhanpat Rai & Co.
2. Yashwant Kanitker, "Let us C++".
3. E. Balaguruswami, "ANSI C++".

Website Sources:

- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.includehelp.com
- www.cplusplus.com
- beginnersbook.com

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (III Semester)

DCS 304:Computer Application Software Packages

Objective: The objective of this course is that students will learn and understand the basic features of Microsoft Office, Windows basics, and file management. Develop the knowledge with Word, Excel, Access, PowerPoint, email, and Internet basics.

UNIT I   (10 Sessions)
Ms Word Processing:
File: Open, Close, Save and Find File, Print and Page Setup
Edit: Cut, Copy, Find, Replace
Insert: Page Insert, Page No., Symbol
Font: Paragraph, Tabs, Border & Shading, Change Case
Tools: Spelling, Mail Merge
Table: Insert Table, Delete Cells, Merge Cell, Sort Text

UNIT II   (10 Sessions)
MS Excel:
File: Open, Close, Save and Find File, Print and Page Setup
Edit: Cut, Copy, Find, Replace, Undo, Redo
Insert: Cell, Row, Worksheet, Chart
Format: Data, Sort, Filter, Form, Table

UNIT III   (08 Sessions)
Power Point:
File: New, Open, Close, Save as HTML, Pack and Go, Page setup, Send to, Properties
Edit: Cut, Copy, Find, Replace, Undo, Redo, Duplicate.
View: Slide Outline, Slide sorter, Note page, Slide show, Master, Black & white slide, Toolbars, Ruler, Guides.
Insert: New slide, Duplicate slide, Picture, Text box, Movies & sound, Hyperlink.
Format: Font, Bullet, Alignment, Line spacing, Slide layout.
Tool: Power point, Presentation & conference, Expand slide, Macro, customize.
Slide show: View show, Rehearse timing, Narration, View on two screens, Active buttons, Preset
Animation, Custom: animation, Slide transition.
Window: New window, Arrange icons, Fit to page, Cascade.

UNIT IV   (07 Sessions)
Electronic Mail:
Composing an Email Message
Automatically add contents to Your Address Book
Reading a message
Checking for New Messages
Reading files Attachment
Taking Acting on a Message

Advantage of using Web Based Email

UNIT V   **(07 Sessions)**
Electronic Commerce: Overview, Definitions, Advantages and Disadvantages of E-commerce, Introduction to Cyber Laws

Course Outcomes:
Students completing this course will be able to:
- Use Microsoft Office programs to create personal, academic and business documents.
- Identify and use E-mail features.
- Create and edit basic Excel spreadsheets.
- Create and edit basic PowerPoint presentations.
- Recognize and discuss global E-commerce issues

Suggested Readings:
1. Microsoft Office 2010 For Dummies By Wallace Wang
2. 2007 Microsoft Office System Plain & Simple by Jerry Joyce- Microsoft Press
3. Office XP : The Complete Reference- Stephen L. Selson - Tata McGraw Hill Education.
4. Working in Microsoft Office - Richard Mansfield - Tata McGraw Hill Education.

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.coursera.org
- www.goskills.com/Course/Microsoft-Word-Basic
- https://www.tutorialspoint.com/e_commerce/

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (III Semester)

DHU301: Organizational Behavior

Objective: To study about Organizational Behavior; their nature and scope, about the basic foundation for an Individual behavior, the fundamentals of Group behaviors, and about various foundations in an organization along with their changes and development.

UNITI   **(06 Sessions)**
Organizational Behaviors: Introduction to Organizational Behaviors, Its Nature & Scope.

UNITII   **(09 Sessions)**
Foundations of Individual Behaviors: Personality, Perception, Learning, Values, Attitudes and Job Satisfaction, Ability and Motivation.

UNITIII   **(07 Sessions)**
Group: Foundations of Group Behaviors: Communication and Group Decision Making; Leadership: Power and Politics, Conflict.

UNITIV   **(07 Sessions)**
Organization: Foundations of Organization Structure: Job Design, Work Settings and Job Stress; Organizational Culture: Meaning, Importance and Characteristics of Organization Culture.

UNITV   **(11 Sessions)**
Organization Change and Development: Significance of Change; Forces of Change: Resistance to Organizational Change; Management of Change Organization Development: Concept, Characteristics and Assumptions; Goals, Approaches and Techniques of Organization Development.

Course Outcomes:
Students after this course will be able to:
- Learn about their individual behaviors.
- Will know how to communicate and involve themselves in group discussions and will have knowledge about the power of leadership along with its pros and cons.
- Will have an idea how an organization works and will be able to bring about changes and developments as and when required.

Suggested Readings:
1. Stephen P. Robbins "Organizational Behavior" 10th Edition.
2. Debra L. Nelson "Organizational Behavior" 2009 Edition.
3. Ankur Chhabra "Organizational Behavior" Sun India Publication.

Website Sources:
- https://nptel.ac.in/courses/110/105/110105033/
- https://www.tutorialspoint.com/organizational_behavior/organizational_behavior_introduction.htm
- https://www.slideshare.net/YaminiKahaliya/organisation-behavior-introduction-of-organisation-behavior-for-bbabcom-students

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (III Semester)

DCS 351: Digital Electronics Lab

Objective: This laboratory will enable the students to learn and implement the basic concepts and techniques in digital electronic circuits and systems.

List of Experiments

1. Introduction to Digital Laboratory Equipments& IC's
2. To study basic gates and verify their truth tables.
3. Bread Board implementation of adder.
4. Bread Board Implementation of subtractor.
5. Write a C program to Verify the Truth Table of Logic Gates.
6. Write a C program to Verify the Truth Table of Universal Logic Gates.
7. To design and verify operation of half adder and full adder.
8. To design and implement encoder and decoder
9. To Study of Binary to Grey Code Converter
10. To design and construct basic flip flops

Course Outcomes:
Students completing this course will be able to:
- Learn the basics of gates.
- Construct basic combinational circuits and verify their functionalities.
- Identify the various digital ICs and understand their operation.
- To understand and implement the basic digital circuits and to verify their operation.

Suggested Readings:
1. Givone: digital Principles & design, TMH
2. Digital Electronics – Dr. Saroj Rangnekar, ISTE/EXCEL BOOKS
3. Malvino: Digital Principles & application TMH
4. Jain: Modern Digital Electronics 2/e TMH
5. Marcovitz: Intro to logic Design Tata Mcgraw-hill
6. Digital Integrated Electronics- H.Taub&D.Shilling, Mc Graw Hill
7. Digital Technology- Virendra Kumar, New Age

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- electronics-course.com
- www.coursera.org
- www.electronics-tutorials.ws

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (III Semester)

DCS 352: Data Structure Lab

Objective: Understanding the importance of data structures, abstract data type, and their basic usability in a different application, implementing linear and non-linear data structures using linked lists and arrays.

List of Experiments

1. Develop a Program to:
    a) Insert the element in an array
    b) Delete an element from an array
    c) Reverse an array
    d) Display the array
2. Implementation of Stack using array.
3. Write a program in C language to implement Linear Queue.
4. Write a program in C language to implement Circular Queue.
5. Write a program in C to perform the following operations in a Linear Linked List:
    a) Create
    b) Display
    c) Exit
6. Write a program in C for various operations on Doubly Linked List.
7. Write a program in C for Binary Traversal Algorithm.
8. Write a program in C for Selection Sort.
9. Write a program in C for Insertion Sort.
10. Write a program in C for Bubble Sort.

Course Outcomes:
Students completing this course will be able to:
- Construct Linear and nonlinear data structures using arrays and linked list
- Choose appropriate data structure to solve various computing problems.
- Identify suitable data structure and algorithm to solve a real world problem.

Suggested Readings:
1. Schaum's Outlines Data structure Seymour Lipschutz Tata McGraw Hill 2nd Edition
2. Data structures & Program Design in C Robert Kruse, C.L.Tondo, Bruce Leung Pearson
3. Data structure using C AM Tanenbaum, Y Langsam& MJ Augustein, Prentice Hall India
4. Data structure – A Pseudocode Approach with C – Richard F Gilberg Behrouz A. Forouzan, Thomson

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com/data_structures_algorithms/
- www.studytonight.com
- www.geeksforgeeks.org

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (III Semester)

DCS 353: C++ Lab

Objective: This laboratory will help to students to identify and practice the object-oriented programming concepts and techniques, practice the use of C++ classes and class libraries, arrays, inheritance and file I/O stream concepts.

List of Experiments

1. Program in C++ to calculate the area of a circle, rectangle and triangle.

2. Program in C++ to print factorial of a given number.

3. Program in C++ to input marks in 5 subjects & calculate aggregate & percentage.

4. Program in C++ to find out whether the given number is odd or even

5. Program in C++ to find out whether the given year is a leap year or not

6. Program in C++ to find out the maximum out of three numbers

7. Program in C++ to generated Fibonacci series 0,1,1,2,3,5,8,13,...n

8. Program in C++ for swapping of two numbers with & without using 3rd variable.

9. Program in C++ to display series and find sum of 1+3+5+……..+n.

10. Program in C++ to implement single inheritance.

Course Outcomes:
Students completing this course will be able to:
- Creating simple programs using classes and objects in C++.
- Implement Object Oriented Programming Concepts in C++.
- An ability to design object-oriented programs with specified functionality.

Suggested Readings:
1. Sumita Arora, "Computer Science using C++", Dhanpat Rai & Co.
2. Yashwant Kanitker, "Let us C++".
3. E. Balaguruswami, "ANSI C++".

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.includehelp.com
- www.cplusplus.com
- beginnersbook.com

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (IV Semester)

DCS 401: Introduction to Computer Network

Objective: The objective of this course is to familiarize the student with the basic arrangement and terminology of the computer network area. And also build an understanding of the fundamental concepts of computer networking.

UNIT I (08 Sessions)
Introduction: Goal and Application of Network, Network Structure and architecture, Network Topology, Terminal Handling.

UNIT II (10 Sessions)
Transmission Media: Twisted pair, Coaxial Cable, Optical Fibers, Wireless Transmission, Microwave, Radio Waves, and Infrared.

UNIT III (08 Sessions)
Protocols and Architecture: Protocols, OSI reference models, TCP/IP protocol suit. Routers, Routing Algorithms, Congestion control algorithm, Addressing, Internet working.

UNIT IV (08 Sessions)
Data Link Control and Protocol: Flow Control - Stop and Wait, Sliding window, Error Detection, Error Control, HDLC. Transport Protocol: Transport services, TCP, UDP, Remote Procedure Call.

UNIT V (10 Sessions)
Local Area Network: LAN architecture, LAN topologies - BUS/Tree LAN, Ring LAN, Star LAN, Wireless LAN, Ethernet and Fast Ethernet (CSMS/CD), Circuit switching, Packet switching, Frame relay, ATM, ISDN

Course Outcomes:
Students completing this course will be able to:
* Understand the concepts of Data Communication.
* Understand basic computer network technology.
* Identify the different types of network topologies and protocols.
* Familiarize with the Transmission Media, Flow Control and Error Detection & Correction.
* Gain familiarity with common networking & Application Protocols.

Suggested Readings:
1. Forouzan "Data Communications and Networking" (3rd Ed.)TMH
2. Tanenbaum "Computer Networks" (4th Ed.) Pearson Education/PHI
3. W. Stallings, "Data and Computer Communication", Macmillan Press

Website Sources:

- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.coursera.org
- www.studytonight.com
- www.geeksforgeeks.org

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (IV Semester)

DCS402: Introduction to Database Management System

Objective: This course is designed to help the students to gain an understanding of Database and its application as well as associated tools and techniques also acquire a good understanding of database systems concepts and to be in a position to use and design databases for different applications.

UNIT I (09 Sessions)
Concepts of DBMS: What is data &information ,Data items, An overview of database management system, database system Vs file system DBA, Entity, Attributes, Logical and Physical data, Primary and secondary keys, Form of query, Redundancy, data definitions language, DML ,Schema and Sub-schema.

UNIT II (10 Sessions)
Relational Database Design: Define data model, classify data model, object based logical model, Record based data model, entity, attribute, Relationship, data model, network model, hierarchy model, top down approach, bottom approach of logical database, need of the normalization. Types of   normal form function and dependency, properties of relation. Referential integrity, relational algebra.

UNIT III (05 Sessions)
File Organisation Techniques: File system for storage Sequential index, Sequential and Random File organization Technique   and their relative advantages and disadvantages.

UNIT IV (08 Sessions)
Security and Privacy: Integrity,   protection,   security, concurrency, Concurrency control, Locking Techniques for concurrency control, recovery.

UNIT V (12 Sessions)
SQL: Introduction to SQL commands, Type of SQL commands and its Application RDBMS. Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands, SQL operators and their procedure.

Course Outcomes:
Students completing this course will be able to:
* Learn various data models used in database design, ER modeling concepts.
* Understand database concepts, security and privacy.
* Recognize and identify the use of normalization and functional dependency.
* Understand the use of SQL and its syntax, transactions, database recovery.
* Develop and evaluate a real database application using a database management system.

Suggested Readings:
1. Date C J, "An Introduction to Database Systems", Addision Wesley

2. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley
4. Leon & Leon, "Database Management Systems", Vikas Publishing House
5. Bipin C. Desai, "An Introduction to Database Systems", Gagotia Publications

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.geeksforgeeks.org
- searchsqlserver.techtarget.com
- https://www.tutorialspoint.com/dbms/index.htm
- www.mysqltutorial.org

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (IV Semester)

DCS 403: Introduction to Operating System

Objective: To study about the basics of an operating system, types of system structures, processes, CPU scheduling, memory management, virtual memory, file system interface and some important case studies.

UNITI (08 Sessions)
Introduction of operating system: Mainframe Systems, Desktop System, Multiprocessor System, Distributed System, Real Time system.

UNITII (08 Sessions)
Computer-System Structures: Computer System Operation, I/O Structure, Storage Structure, Storage Hierarchy.
Operating- System Structures: System Components, Operating-System Services.

UNITIII (09 Sessions)
Processes: Process definition, Process concept, Process Scheduling
CPU Scheduling: Scheduling concepts, Scheduling Algorithm-FCFS, SJF, Priority and Round Robin Scheduling.

UNITIV (09 Sessions)
Memory Management: Concept, Swapping, Paging, Segmentation
Virtual Memory: Define Virtual Memory, Demand Paging, Page Replacement.

UNITV (09 Sessions)
File-System Interface: File Concept, Access Methods, Directory Structure, Difference between File and Directory, File-System Structure
Case Study: Different version of Windows, Introduction about Linux, Mobile and MS-DOS operating system

Course Outcomes:
Students after this course will be able to:
- Define the basics of an operating system and the types of systems.
- Explain in depth about Processes and CPU scheduling.
- Describe about memory management and virtual memory.
- Have knowledge about some of the important case studies.

Suggested Readings:
1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
3. Harvey M Dietel, "An Introduction to Operating System", Pearson Education
4. D M Dhamdhere, "Operating Systems: A Concept based Approach", 2nd Edition, TMH

5. William Stallings, "Operating Systems: Internals and Design Principles", 6th Edition, Pearson Education.

Website Sources:

- https://www.geeksforgeeks.org/introduction-of-operating-system-set-1/
- https://nptel.ac.in/courses/106/106/106106144/
- https://www.tutorialspoint.com/operating_system/index.htm

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (IV Semester)

DCS 404: Introduction to Management Information System

Objective: This course is designed to help the students learn how to use and manage information technologies to revitalize business processes, improve business decision-making and gain competitive advantage and to understand the features of the latest technologies and their applications. It also enables students to communicate effectively in the context of MIS.

UNIT I (08 Sessions)
Foundation Concepts: Information Systems, Information System, Framework, Role of Information System in Business, Types of Information System, System, Feedback and Control, Component of Information System, Information System Resources

UNIT II (09 Sessions)
Information Technologies & Data Resource Management: Foundation Data Concepts, Types of Database, Database Management Approach, Database Structure Telecommunication and Computer Network Business value of Telecommunication Networks, The Internet Revolution, Role of Intranets, Extranets, Types of Telecommunication network, Telecommunication Software

UNIT III (09 Sessions)
Business Applications: Electronic Business Systems, ERP, Supply Chain Management Systems, Customer Relationship Management Systems, IT in Business, Scope of Electronic Commerce, EPS

UNIT IV (10 Sessions)
Development Process: System Approach, Systems Development Cycle, Development Process, System Analysis, Other Implementation Activities

UNIT V (06 Sessions)
Management Challenges: Introduction, Ethical and Social Issues Related to Business/IT, Computer Crime, Computer Viruses and Worms, Other Challenges-Employment Challenges, Computer Monitoring, Ergonomics

Course Outcomes:
Students completing this course will be able to:
- To learn the basic concepts and technologies used in the field of MIS.
- To learn and understand the role of the ethical, social, and security issues of information systems.
- Understanding of the various techniques for telecommunication.
- Understand the specific threats and vulnerabilities of computer systems.
- Understand the role of information technology in business administration.

Suggested Readings:
1. James A. O'Brien, Introduction to Information System, TMH.
2. Banerjee, U. K., & Sachdeva, R. K. Management information system: A new frame work. New Delhi: Vikas Publishing House.
3. Ahituv, N., Neumann, S., & Riley, H. N. Principles of information systems for management (4th ed.). Dubuque, IA: Wm. C. Brown Communications.

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- books.google.co.in
- www.smartsheet.com
- www.guru99.com/mis-definition.html
- www.tutorialspoint.com/

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (IV Semester)

DCS 405: Basics of Computer Organization

Objective: To study about Digital logic circuits, the different digital components, basic computer organizations and how to program them, and about memory organization. This course will also expose students to the basic architecture of processing, memory and input/output organization in a computer system.

UNITI   **(09 Sessions)**
Digital Logic Circuits: Digital Computer, Logic Gates, Boolean algebra, Map Simplification, Combinational Circuits- Half-Adder, Full Adder, Flip Flops, Sequential Circuits, Data Types, Complements

UNITII   **(10 Sessions)**
Digital Components: IC, Decoders, Multiplexers, Registers, Shift Registers, Memory Unit
Register Transfer And Microoperation: Introduction about Register Transfer, Bus and Memory Transfers, Micro operation

UNITIII   **(09 Sessions)**
Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, I/O and Interrupt

UNITIV   **(07 Sessions)**
Programming the basic Computer: Machine Language, Assembly Language, Assembler, Program Loops, Programming Arithmetic and Logic Operations Subroutines, I/O Programming

UNITV   **(07 Sessions)**
CPU: Introduction, General Register Organization, Control Word, Stack Organization, Instruction Format, Addressing Modes
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Course Outcomes:
Students after the course will be able to:
- Define digital logic circuits, and its different components.
- Explain about basic computer organizations and how to program them and design them.
- Describe about CPU, and the entire memory organization: its hierarchy and the types of memory.

Suggested Readings:
1. M. MorrisMano," Computer System Architecture", Prentice Hall of India, 2001.
2. John.p. Hayes, "Computer Architecture and Organization", Tata McGraw Hill, 1996.

3. V.C.Hamatcher, et al "Computer Organization", Tata McGraw Hill, 1996

Website Sources:

- https://www.javatpoint.com/computer-organization-and-architecture-tutorial
- https://www.tutorialspoint.com/computer_logical_organization/index.htm
- https://nptel.ac.in/courses/106/105/106105163/
- https://www.geeksforgeeks.org/computer-organization-basic-computer-instructions/

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (IV Semester)

DCS 451: Computer Network Lab

Objective: To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.

List of Experiments

1. Study of different types of Network cables and their use.

2. Study of Cross-wired cable and straight through cable using clamping tool.

3. Study of Network Devices.

4. Study of network IP.

5. Connect the computers in Local Area Network.

6. Study of basic network commands.

7. Network configuration commands.

8. Configure a Network topology using packet tracer software.

Course Outcomes:
Students completing this course will be able to:
- Study of Network Devices.
- Recognize the technological trends of Computer Networking.
- Understand fundamental underlying principles of computer networking
- Evaluate the challenges in building networks and solutions to those.

Suggested Readings:
1. Forouzan "Data Communications and Networking" (3rd Ed.)TMH
2. Tanenbaum "Computer Networks" (4th Ed.) Pearson Education/PHI
3. W. Stallings, "Data and Computer Communication", Macmillan Press

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.coursera.org
- www.studytonight.com
- www.geeksforgeeks.org

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (IV Semester)

DCS 452: DBMS Lab

Objective: This laboratory will help to students to learn and practice database management systems, with an emphasis on how to create, organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

List of Experiments

1. To implement DDL and DML commands
2. Write SQL queries using aggregate functions (sum, avg, count etc)
3. Write SQL queries using set operations
4. To create view of the tables
5. Write SQL queries using operators

Course Outcomes:
Students completing this course will be able to:
- Design and implement a database schema for a given problem-domain.
- Understand the use of SQL and query a database using DML/DDL commands.
- Declare and enforce integrity constraints on a database.
- Develop and evaluate a real database application using a database management system.

Suggested Readings:
1. Date C J, "An Introduction to Database Systems", Addision Wesley
2. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley
4. Leon & Leon, "Database Management Systems", Vikas Publishing House
5. Bipin C. Desai, "An Introduction to Database Systems", Gagotia Publications

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.geeksforgeeks.org
- searchsqlserver.techtarget.com
- https://www.tutorialspoint.com/dbms/index.htm
- www.mysqltutorial.org

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) II Year (IV Semester)

DCS 453: Operating System Lab

Objective: To study about the basic UNIX Shell and MS-DOS Commands, implement FCFS CPU scheduling algorithm, Round Robin Scheduling algorithm, FIFO page replacement algorithms etc. with the help of C programs. Students will gain practical experience with designing and implementing concepts of operating systems.

List of Experiments

1. Study of UNIX Shell Commands.

2. Study of MS-DOS Commands.

3. Write a C Program to implement FCFS CPU scheduling algorithms.

4. Write a C Program to implement SJF scheduling algorithms.

5. Write a C Program to implement Priority Scheduling algorithms.

6. Write a C Program to implement Round Robin Scheduling algorithms

7. Write a C Program to implement FIFO Page replacement algorithms.

8. Write a C Program to implement LRU Page replacement algorithms.

Course Outcomes:
Students after this course will be able to:
- Experiment with UNIX commands and shell programming.
- Make FCFS CPU scheduling algorithm and implement in C Program.
- Implement SJF Scheduling algorithm and make a program in C language.
- Build C program for FIFO Page Replacement, LRU Page Replacement, etc.

Suggested Readings:
1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
3. Harvey M Dietel, "An Introduction to Operating System", Pearson Education
4. D M Dhamdhere, "Operating Systems: A Concept based Approach", 2nd Edition, TMH
5. William Stallings, "Operating Systems: Internals and Design Principles", 6th Edition, Pearson Education.

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- https://nptel.ac.in/courses/106/106/106106144/
- https://www.tutorialspoint.com/operating_system/index.htm

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (V Semester)

DCS 501: System Administration

Objective: To study about the basics of number representation, memory hierarchy and types of memory, computing along with types of MIMD architecture, how microprocessor evolved and its types, interfacing devices and about instruction classification.

UNITI   **(10 Sessions)**
Number representation: Fixed and Floating-Point number representation, IEEE standard for floating point representation, Booth Algorithm multiplication, Digital Computer Generation computer, Types and classification, Buses, Bus architecture.

UNITII   **(09 Sessions)**
General Register Organization: Stack Organization and addressing modes, Memory Hierarchy, Cache Memory, Main Memory, Auxiliary Memory: Magnetic disk, Magnetic tape, Virtual Memory.

UNITIII   **(10 Sessions)**
Parallel Computing: Parallel Computer Model, Introduction to MIMD Architecture, Shared Memory MIMD Architecture, SIMD Architecture, PRAM Algorithms: Parallel Reduction, Prefix Sum, Preorder Tree Traversal, Merging Sorted list.

UNITIV   **(09 Sessions)**
Microprocessor Evolution and Types: Microprocessor Architecture and Operation of its Components, Addressing modes, Interrupt, Data Transfer Schemes, Instruction a data flow timer and timing diagram.

UNITV   **(06 Sessions)**
Interfacing devices: Architectural advancement of Microprocessor development schemes, Registers, Instruction Classification: Data Transfer, Arithmetic Operations, Logical operations.

Course Outcomes:
Students after this course will be able to:
- Describe the fundamentals of Number representation.
- Explain how a memory hierarchy is formed and their types.
- Give a brief about MIMD architecture and its classification.
- Define how a microprocessor evolved and its various types.
- Transfer data; know about Arithmetic operations and logical operations.

Suggested Readings:
1. M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education.
2. Kai Hwang, *Advanced Computer Architecture: Parallelism, Scalability, Programmability,* McGraw-Hill, 1993. ISBN 0-07-113342-9.

3. Gaonkar, Ramesh S, "Microprocessor Architecture, Programming and Applications with 8085", Penram International Publishing.
4. Aditya P Mathur, "Introduction to Microprocessor", TMH
5. Patterson, Computer Organization and Design, Elsevier Pub. 2009

Website Sources:
- https://nptel.ac.in/courses/117/105/117105078/
- https://www.geeksforgeeks.org/computer-organization-basic-computer-instructions/
- https://en.wikipedia.org/wiki/Computer_architecture

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (V Semester)

DCS 502: Java Programming

Objective: To studythe syntax and semantics of the basic Java language for writing Java programs to use concepts such as variable, conditional and iterative execution methods. Understand the basics of object-oriented programming in Java, including exception handling such as calling, definition methods of class objects, mechanism.

UNITI (08 Sessions)
Introduction: History & Evolution of java, an overview of java, Concept of data types, variables.

UNITII (08 Sessions)
Concept of Classes &object oriented programming (Inheritance, Encapsulation, and polymorphism)

UNITIII (07 Sessions)
Array: one dimensional multidimensional array Operators & various Control Statements

UNITIV (08 Sessions)
Packages & Interfaces, Exception Handling, Multiprogramming, I/O in java & applets

UNITV (09 Sessions)
Introduction to JDBC with MS Access and Servers like MS SQL

Course Outcomes:
Students after this course will be able to:
- Write, compile, run, and test simple object-oriented Java programs using an integrated development environment.
- Identify the classes, objects, and members of a class needed for a particular problem and the relationships between them.
- Demonstrates the concept of polymorphism and inheritance.
- Using the principles of OOP and proper program structure to write Java application programs.
- Using exception handling to write Java programs that implement error handling techniques.

Suggested Readings:
1. Naughton, Schildt, "The Complete Reference JAVA2", TMH
2. Pandey, Tiwari, "Object Oriented Programming with JAVA", Acme Learning.
3. Horstmann, "CoreJava", Addison Wesley.

Website Sources:
- https://www.tutorialspoint.com/java/index.htm
- https://www.w3schools.com/java/default.asp
- https://beginnersbook.com/java-tutorial-for-beginners-with-examples/

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (V Semester)

DCS 503: Computer Graphics & Multimedia

Objective: The course objective is to provide an overview of the basic fundamentals of computer graphics and detail knowledge about the graphics algorithms. It helps students enhance their skills to design and implement 2D/3D object representations, transformations, modeling and rendering algorithms.

UNIT I   **(08 Sessions)**
Introduction: Computer Graphics, Display Device, General purpose Graphics Software, display of solids object.

UNIT II   **(10 Sessions)**
Display Techniques and Devices: Display Techniques and Devices: Point Plotting Technique Coordinate systems and incremental methods, line-Drawing. Algorithms, circle Generators, Display Devices, CRT, Inherit Memory Devices, The storage tube display.

UNIT III   **(10 Sessions)**
Graphic Packages and Display Files: A Simple Graphics package Segments, Functions for Segmenting the Display files, Segment naming schemes, appending the Segment display file structure. Geometric Models. Defining symbols procedures, Display Procedure.

UNIT IV   **(10 Sessions)**
Two Dimensional Transformation: A line clipping Algorithm, Midpoint, division, clipping other Graphics Entities, Polygon Clipping, and Viewing Transformation, windowing Transformation.

UNIT V   **(06 Sessions)**
Input Devices: Pointing and positioning Devices, Mouse lets the light pen, Three Dimensional input devices.

Course Outcomes:
Students completing this course will be able to:
- Understand the use of the components of a graphics system.
- To learn and understand the various display techniques and devices.
- To implement various algorithms to scan, convert the basic geometric primitives, transformations, Area filling, clipping.
- To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
- To learn and understand the various input devices.

Suggested Readings:
1. Hearn, Baker – "Computer Graphics (C version 2nd Ed.)" – Pearson Education
2. Z. Xiang, R. Plastock – "Schaum's outlines Computer Graphics (2nd Ed.)" – TMH
3. D. F. Rogers, J. A. Adams – "Mathematical Elements for Computer Graphics (2nd Ed.)" – TMH

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.javatpoint.com
- www.coursera.org
- www.tutorialandexample.com
- www.ncertbooks.guru

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (V Semester)

DCS 504: Introduction to Software Engineering Principles

Objective: In this course, students will gain a broad understanding of the discipline of software engineering and its application to develop and maintain software. It's also providing the knowledge to produce efficient, reliable, robust and cost-effective software solutions.

UNIT I   **(08 Sessions)**
Introduction to Software Engineering: Software Engineering Definition, Software Components, Software Characteristics, Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT II   **(10 Sessions)**
Software Requirement Specifications: Requirement Engineering, Types of Requirements, Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Data Flow Diagrams, Entity Relationship Diagrams, SRS Document.

UNIT III   **(09 Sessions)**
Software Design: Basic Concept of Software Design, Flow Charts, Modularity-Coupling and Cohesion, Strategy of Design-Top-Down and Bottom-Up Design. Design Strategies: Function Oriented Design, Object Oriented Design

UNIT IV   **(11 Sessions)**
Software Testing: Testing Objectives, Unit Testing, Integration Testing, System Testing, Top-Down and Bottom-Up Testing Strategies, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Some Terminologies- Error, Mistake, Bug, Fault and Failure, Verification and Validation, Alpha and Beta Testing, Debugging

UNIT V   **(07 Sessions)**
Software Maintenance and Project Management: Size Estimation, Cost Estimation, The Constructive Cost Model (COCOMO), Software Maintenance, Categories of maintenance

Course Outcomes:
Students completing this course will be able to:
- To understand the nature of software development and software life cycle process models.
- Understanding of software requirements and the SRS documents.
- To learn the basics of testing and understanding the concept of software quality assurance.
- An ability to identify and solve complex problems by applying software engineering principles.

- To learn and understand the role of project management including planning, scheduling, risk management, etc.

Suggested Readings:
1. Roger S.Pressman, Software engineering-A practitioner's Approach, McGraw-Hill International Edition, 5th edition, 2001.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers
3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
4. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.

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- www.tutorialspoint.com

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (V Semester)

DCS 505: Web Designing

Objective: To study about the client server architecture and can develop web applications using Java technology. Students gain the skills and project-based experience required to enter a career in web applications and development. Students will learn the web language, responsive web design techniques including HTML and CSS media queries.

UNITI (09 Sessions)
Introduction and web development strategies: History of Web, Protocols governing Web, Creating Websites for individual and Corporate World, Cyber Laws Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development.

UNITII (08 Sessions)
Introduction to HTML, CSS: The development process, basic HTML, HTML tags, element, attributes, formatting and fonts, commenting code, colour, hyperlink, lists, tables, images, simple HTML forms, frames, links, Introduction to CSS.

UNIT III (08 Sessions)
Web Server: Introduction to Web Server, Introduction of Tomcat web Server, Accessing Web server- Tomcat and IIS

UNITIV (09 Sessions)
Server side Programming: Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages.

UNITV (08 Sessions)
Database Connectivity: Database Programming using JDBC, Studying Javax.sql.*package, accessing a database from a JSP page, Application-specific Database Action.

Course Outcomes:
Students after this course will be able to:
- Defining the principles of web page design, basics of web design.
- Visualize the basic concepts of HTML.
- Recognize HTML elements; introduce the basic concepts of CSS.
- Write a server side Java application called JSP to catch form data sent from the client and store it on database.
- Develop the concept of web publishing.

Suggested Readings:

1. Burdman, "Collaborative Web Development" Addison Wesley.
2. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech
3. Joel Sklar , "Principal of web Design" Vikash and Thomas Learning
4. Horstmann, "CoreJava", Addison Wesley.
5. Herbert Schieldt, "The Complete Reference:Java", TMH.
6. Pankaj Sharma "Introduction to Web Technology".

Website Sources:

- https://www.tutorialspoint.com/internet_technologies/website_designing.htm
- https://www.cs.uct.ac.za/mit_notes/web_programming.html
- https://www.w3schools.com/

DCS 551: System Administration Lab

Objective: To study about how to install Client Operating System, Server Operating System, toperform user account management and implement security groups, perform network services installation and management.

List of Experiments

1. Installing a Client Operating System (Windows XP).

2. Installing Server Operating System (Windows Server 2008 version).

3. Creating an Active Directory.

4. Creating Various Client accounts and setting up Permissions

5. Creating a File Server, applying permissions for various users.

6. Installing LINUX/UBUNTU (Client).

7. Setting up an IIS server, hosting a website on IIS.

Course Outcomes:
- Students after this course will be able to:
- Install operating system such as Windows10, Windows Server 2008 etc.
- Create a client account and how permission is given for that account.
- Install LINUX/UBUNTU in the system.
- Setup IIS server and hosting a website on it.

Suggested Readings:
1. M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education.
2. Kai Hwang, *Advanced Computer Architecture: Parallelism, Scalability, Programmability,* McGraw-Hill, 1993. ISBN 0-07-113342-9.
3. Gaonkar, Ramesh S, "Microprocessor Architecture, Programming and Applications with 8085", Penram International Publishing.
4. Aditya P Mathur, "Introduction to Microprocessor", TMH
5. Patterson, Computer Organization and Design, Elsevier Pub. 2009

Website Sources:
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- https://www.geeksforgeeks.org/computer-organization-basic-computer-instructions/
- https://en.wikipedia.org/wiki/Computer_architecture

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (V Semester)

DCS 553: Computer Graphics Lab

Objective: The objective of this laboratory is to introduce to the students the concepts of computer graphics. It starts with an overview of interactive computer graphics, two-dimensional system and mapping, then practice drawing algorithms, two-dimensional transformation, clipping and filling.

List of Experiments

1. Write a program in C to draw a circle on screen using graphics.h header file.

2. Write a program in C to draw a rectangle and a bar on screen using graphics.h header file.

3. Write a program in C to draw an Eclipse Shape on screen using graphics.h header file.

4. Write a program in C to draw sine wave using graphics.h header file.

5. Write a program in C to draw bar chart on screen using graphics.h header file.

6. Write a program in C to draw pie chart using graphics.h header file.

7. Write a program in C to draw stars in night sky using graphics.h header file.

8. Write a program in C language to draw a line using DDA algorithm.

9. Write a program in C language to draw a line using Bresenhem's algorithm.

10. Write a program in C language to draw a circle using Mid-point algorithm.

Course Outcomes:
Students completing this course will be able to:
- To implement various algorithms to scan, convert the basic geometric primitives, transformations, Area filling, clipping.
- To be able to use of computer graphics concepts in the development of computer games, information visualization, and business applications.

Suggested Readings:
1. Hearn, Baker – "Computer Graphics (C version 2nd Ed.)" – Pearson Education
2. Z. Xiang, R. Plastock – "Schaum's outlines Computer Graphics (2nd Ed.)" – TMH
3. D. F. Rogers, J. A. Adams – "Mathematical Elements for Computer Graphics (2nd Ed.)" – TMH

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- www.javatpoint.com
- www.coursera.org
- www.tutorialandexample.com
- www.ncertbooks.guru

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (V Semester)

DCS 555: Web Designing and JAVA Lab

Objective: To study about the basic understanding of operations in java and implement them, how to implement object-oriented designs with Java, understand the basic elements in HTML and how to use tables, frames and forms in HTML.

List of Experiments

1. To understand of basic operations in JAVA.
2. To understand the control statement in JAVA.
3. To understand the concept of class and object in JAVA.
4. To understand the concept of Array in JAVA.
5. To understand the concept of Exception handling in JAVA.
6. To understand basic elements in HTML.
7. To understand use of table in HTML.
8. To understand use of frame in HTML.
9. To understand use of form in HTML.
10. To understand validation in HTML through JAVASCRIPT.

Course Outcomes:
Students after this course will be able to:
- Implement basic operations of JAVA programming.
- Run, and test simple object-oriented Java programs.
- Implement JAVA program using exception handling
- Demonstrate knowledge and skills using various HTML tags for designing static web pages.
- Design a screen-based user interface using graphic text components.

Suggested Readings:
1. Burdman, "Collaborative Web Development" Addison Wesley.
2. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech
3. Naughton, Schildt, "The Complete Reference JAVA2", TMH
4. Pandey, Tiwari, "Object Oriented Programming with JAVA", Acme Learning.

Website Sources:
- https://www.tutorialspoint.com/java/index.htm
- https://www.w3resource.com/java-exercises/datetime/index.php
- https://www.tutorialspoint.com/html/index.htm
- https://www.w3schools.com/html/html_exercises.asp

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (VI Semester)

DCS 601: .Net Programming

Objective: This course is designed to help the students to get familiarize with Microsoft.Net technologies. This course also helps to understand the different concepts and features of .NET coding, debugging and developing of window and web based applications.

UNIT I (08 Sessions)
Introduction to .Net technology: Components of .Net, Framework, various types of applications developed using .Net

UNIT II (06 Sessions)
Introduction to .Net IDE (Integrated Development Environment): Creating a project, Handling Controls, Executing an Application

UNIT III (08 Sessions)
Basic language & Features of C#: Various data types in C#, Statements, Decision making, looping & Control Statements, Arrays, Procedure & Functions.

UNIT IV (12 Sessions)
OOPs Concept & their Implementation: OOPs Concepts, Classes, Objects, Inheritance, Polymorphism, Encapsulation, Namespaces & Interfaces, Exception Handling, Input & output Streams.

UNIT V (08 Sessions)
Introduction to ADO.NET (ActiveX Data Object): Connected & Disconnected ADO.NET, Creating a connection, Command, Adapter, Dataset Objects, Connection to MS Access and Servers like MS SQL.

Course Outcomes:
Students completing this course will be able to:
- To learn and understand .Net Framework.
- An ability to develop simple and complex applications using the .Net framework.
- An ability to create and manipulate GUI components in C#.
- To develop database applications using ADO.Net.
- To perform database operations for Windows Form and web applications.

Suggested Readings:
1. Jeff Ferguson, Brain Patterson, Jason Beres, Pierre Boutqin and Meetagupta, " C# Bible", Wiley Publicaion, Inc.
2. John Sharp, "Microsoft Visual c# 2005 step by step" Microsoft
3. Comlete Reference, Visual Basic .Net, 2010.

Website Sources:

- onlinecourses.nptel.ac.in
- en.wikipedia.org
- books.google.co.in
- www.tutorialspoint.com
- dotnet.microsoft.com
- www.w3schools.com

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (VI Semester)

DCS 602: Computer Hardware Maintenance

Objective: To study about computer maintenance, upgrades, and repairs. This course covers most areas of system improvement, including motherboard, processor, memory, and power improvements. In addition, this course explains the proper management of systems and components, and explains to students how to find and identify failed components. Students learn about powerful diagnostic hardware and software that helps the system determine the cause of problems and how to recover.

UNIT I   (08 Sessions)
Basic Computer System & Peripherals: Input & Output Devices, their types and specifications, CPU, Memory devices- types primary and secondary.

UNIT II   (09 Sessions)
Mother Board: Study of Motherboard RAM, ROM, CMOS, POST, BUS, (Address, Data, and System) Connections of various devices such as Display Adapter, Ports (Serial, Parallel, USB) and Modem on the Mother Board. Importance of CPU cooling, Motherboard troubleshooting

UNIT III   (08 Sessions)
Serial Devices: Key Board: Switches, Keyboard organization, Key board type, Wireless Keyboard Trouble shooting. Mouse: Mouse type- Scroll & Optical Mouse, Function Connecting Mouse, Trouble shooting Mouse. Ports, Modems

UNIT IV   (09 Sessions)
Storage Devices: HDD: HDD types, integrated, SCSI, Magnetic recording, Formatting (Track, Sector) Cluster, Defragmentation, Bad Sector, Jumper Setting, Common Problem and its trouble Shooting, External Drive (HDD), Optical Drives. CD and DVD drives: ROM and Writer, COMBO drives, Mass Storage Devices. USB Devices: Pen Drives

UNIT V   (08 Sessions)
Parallel Devices: Printers: Working of DMP, Ink Jet, Laser Printer, and line printer, MFP (Multi Functional Printer and its Trouble shooting. Scanners- Working method and its trouble shooting Plotters, System Software, Application Software driver Software Installation, Windows and other software &Anti Virus , Setting of CMOS, Operating characteristics, Types and maintenance. BIOS/ CMOS setting

Course Outcomes:
Students after this course will be able to:
- Identify the main components of the computer system.
- Define about memory and its types in detail.

- Familiarize themselves with PC memories such as RAM and ROM devices. This includes RAM types, RAM upgrading, ROM BIOS, and the CMOS chip.
- Describe how to prepare a HDD for storing data, installing Windows OS and variousprograms. This will be combined with the knowledge about disk technologies and the IDE systems.
- Explain how different types of printer works.

Suggested Readings:
1. Subhadeep Choudhary, The A-Z of PC Hardware & Maintenance part I and II.
2. Govindrajalu, IBM PC and Clones.
3. Balasubramanyam, Computer Installation and Servicing.
4. William A. Lloyd, "A Guidebook in PC Hardware, Maintenance and Repair",

Website Sources:
- https://nptel.ac.in/courses/106/105/106105194/
- https://www.javatpoint.com/hardware
- https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.htm

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (VI Semester)

DCS 651: .Net Programming Lab

Objective: This course will help the students to use C# programming to build Windows applications using object-based programming techniques. Students will also cover all the concepts of .net technology.

List of Experiments
1. Print "Hello C#" in C#.

2. Implement break statement in C#.

3. Implement loop statement in C#.

4. Write a Program in C# to find the roots of Quadratic Equation.

5. Write a Program in C# to check whether a number is even or not.

6. Write a Program in C# to read and print elements of an array.

7. Write a Program in C# to implement polymorphism.

8. Write a Program in C# to implement single inheritance.

9. Write a Program in C# to input marks in 5 subjects and calculate aggregate & percentage.

10. Write a program using function overloading to swap two integer numbers and swap two float numbers.

Course Outcomes:
Students completing this course will be able to:
- Ability to practice program with console application in C#.
- To develop database applications using ADO.Net.
- To perform database operations for Windows Form and web applications.

Suggested Readings:
1. Jeff Ferguson, Brain Patterson, Jason Beres, Pierre Boutqin and Meetagupta, " C# Bible", Wiley Publicaion, Inc.
2. John Sharp, "Microsoft Visual c# 2005 step by step" Microsoft
3. Comlete Reference, Visual Basic .Net, 2010.

Website Sources:
- onlinecourses.nptel.ac.in
- en.wikipedia.org
- books.google.co.in
- www.tutorialspoint.com
- dotnet.microsoft.com
- www.w3schools.com

IFTM University, Moradabad
Diploma (Computer Science and Engineering) Programme
Diploma (CS&E) III Year (VI Semester)

DCS652: Computer Hardware and Maintenance Lab

Objective: To study about software installation, computer hardware processors, memory, motherboards, various add-on cards and other peripherals such as printers, plotters and scanners. Students are being trained in computer assembly and disassembly.

List of Experiments

1. Study of Motherboard and its components.

2. Configuring and Installing HDD on Motherboard.

3. Configuring and Installing CD/ DVD on Motherboard.

4. Configuring printers in Windows.

5. Study and Using Control Panel in Windows.

6. Installing Hardware such as video card drivers in Windows.

7. Study and installing Operating System as Windows XP.

8. Using the FDISK and FORMAT commands in DOS.

Course Outcomes:
Students after this course will be able to:
- Work on microcomputer systems under supervision.
- Use a practical approach to provide students with a basic level of skill for working on computers upgrade existing hardware/software as needed.
- Integrates into the computer local area network, reinstall the operating system and various onboard programs.
- Update anti-virus software and set schedules.

Suggested Readings:
1. Subhadeep Choudhary, The A-Z of PC Hardware & Maintenance part I and II.
2. Govindrajalu, IBM PC and Clones.
3. Balasubramanyam, Computer Installation and Servicing.
4. William A. Lloyd, "A Guidebook in PC Hardware, Maintenance and Repair",

Website Sources:
- https://nptel.ac.in/courses/106/105/106105194/
- https://www.javatpoint.com/hardware
- https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.htm