Swami Vivekananda University
School of Computer Science and Engineering
Programme: Diploma in Computer Science and Technology

Swami Vivekananda University
School of Computer Science and Engineering
Programme: Diploma in Computer Science and Technology
(As per UGC CBCS Template)
2021

Semester I

Course Code	Course Name	Course Type	L - T - P	Credits	Total Marks
DEMA101	Mathematics-I	CC-1	2 - 1 – 0	3	100
DPHYC101	Applied Physics-I	CC-2	2 - 1 – 0	3	100
DCHMC101	Applied Chemistry-I	CC-3	2 - 1 – 0	3	100
HU101	Communication Skills in English	AECC-1	2 – 0 – 0	2	100
DCES181	Engineering Graphics	SEC-1	0 - 0 – 3	1.5	100
DMES181	Engineering Workshop Practice	SEC-2	0 - 0 – 3	1.5	100
DPHYC191	Applied Physics-I Lab	CC-2	0 - 0 – 2	1	100
DCHMC191	Applied Chemistry Lab	CC-3	0 - 0 – 2	1	100
DCSTS101	Sports and Yoga	SEC-3	0 - 0 – 2	1	100
HU191	Communication Skills in English Lab	AECC-1	0 - 0 – 2	1	100
Total				**18**	**1000**

Semester II

Course Code	Course Name	Course Type	L - T - P	Credits	Total Marks
DEMA202	Mathematics-II	CC-4	3 - 1 – 0	4	100
DPHYC201	Applied Physics-II	CC-5	2 - 1 – 0	3	100
DCSTC201	Introduction to IT Systems	CC-6	2 - 0 – 0	2	100
DECEEC201	Fundamentals of Electrical & Electronics Engineering	CC-7	2 – 1 – 0	3	100
DMES201	Engineering Mechanics	SEC-4	2 – 1 – 0	3	100
DPHYC291	Applied Physics-II Lab	CC-5	0 - 0 – 2	1	100
DCSTC291	Introduction to IT Systems Lab	CC-6	0 - 0 – 4	2	100
DECEE291	Fundamentals of Electrical & Electronics Engineering Lab	CC-7	0 - 0 – 2	1	100
DMES291	Engineering Mechanics Lab	SEC-4	0 - 0 – 2	1	100
DEVSC201	Environmental Science	CC-8	2 - 0 – 0	0	100
Total				**20**	**1000**

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Semester III

Course Code	Course Name	Course Type	L - T - P	Credits	Total Marks
DCSTC301	Computer Programming	CC-9	3 – 0– 0	3	100
DCSTC391	Computer Programming Lab	CC-9	0 – 0– 3	2	100
DCSTC302	Data Structures	CC-10	3 – 0– 0	3	100
DCSTC392	Data Structures Lab	CC-10	0 – 0– 3	2	100
DCSTC303	Computer System Organization	CC-11	3 – 0– 0	3	100
DCSTC304	Algorithms	CC-12	3 – 0– 0	3	100
DCSTS381	Summer Internship-I	SEC-5	0 – 0– 3	2	100
Total				**18**	**900**

SEMESTER – IV

Course Code	Course Name	Course Type	L - T - P	Credits	Total Marks
DCSTC401	Operating Systems	CC-13	3 – 0– 0	3	100
DCSTC491	Operating Systems Lab	CC-14	0 – 0– 3	2	100
DCSTC402	Introduction to DBMS	CC-15	3 – 0– 0	3	100
DCSTC492	Introduction to DBMS Lab	CC-15	0 – 0– 3	2	100
DCSTC403	Computer Networks	CC-16	3 – 0– 0	3	100
DCSTD401	**Open Elective-I** A. Distributed System B. Principles of Virtual Reality	DSE-1	3 – 0– 0	3	100
DCSTS401	Web Technologies	SEC-6	3 – 0– 0	3	100
DCSTD402	Essence of Indian Knowledge and Tradition	SEC-7	3 – 0– 0	3	100
Total				**22**	**900**

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Semester V

Course Code	Course Name	Course Type	L - T - P	Credits	Total Marks
DCSTC501	E-commerce	CC-17	3 – 0– 0	3	100
DCSTC502	Internet of Things	CC-18	3 – 0– 0	2	100
DCSTD501	**Program Elective-I** A. Fundamentals of AI B. Advanced Computer Networks	DSE-2	3 – 0– 0	3	100
DCSTD502	**Program Elective-II** A. Information Security B. Network Forensics	DSE-3	3 – 0– 0	2	100
DCSTE501	**Open Elective-II** A. FOSS (Free and Open Source Software) B. Data Sciences: Data Warehousing and Data Mining	SEC-8	3 – 0– 0	3	100
DCSTS581	Minor Project	SEC-9	0 – 0– 3	3	100
Total				**16**	**700**

Semester VI

Course Code	Course Name	Course Type	L - T - P	Credits	Total Marks
DCSTD601	**Program Elective-III** A. Software Testing B. Information Storage Management	DSE-4	3 – 0– 0	3	100
DCSTD602	**Program Elective-IV** A. Advanced Java B. Mobile Application Development	DSE-5	3 – 0– 0	3	100
DCSTE601	**Open Elective-III** A. Cyber Security B. Cloud Computing	SEC-10	3 – 0– 0	3	100
DCSTS601	Indian Constitution	AECC-2	3 – 0– 0	3	100
DCSTS681	Major Project	SEC-11	0 – 0– 4	4	100
Total				**16**	**500**

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Semester I

Course Name: Mathematics – I
Course Code: DEMA101
Contact: 2L+1T
Credits: 3
Contact Hrs: 45

Module I

Algebra

1.1 Logarithm: **[3H]**

1.1.1 Definition of natural and common logarithm.
1.1.2 General Properties of logarithm and simple problems

1.2 Complex Numbers: **[5H]**

1.2.1 Definition of Complex numbers, Real and Imaginary parts of a complex number, Equality of two
complex numbers, Conjugate of a complex number
1.2.2 Modulus and Argument of a complex number and simple problems
1.2.3 Polar and Cartesian forms of a complex number and their relation.
1.2.4 Algebraic operations (Addition, Subtraction, multiplication, Division) of complex numbers
1.2.5 De Moivre's Theorem (without proof) and simple problems.
1.2.6 Cube roots of unity and their properties with problems.

1.3 Quadratic Equations: **[4H]**

1.3.1 Definition of Quadratic Equations.
1.3.2 Finding the roots of a quadratic equation, conjugate roots& simple problems
1.3.3 Nature of the roots using discriminant & problems
1.3.4 Relation between roots and co-efficient & problems
1.3.5 Formation of quadratic equations if roots are given.

1.4 Binomial Theorem: **[4H]**

1.4.1 Definition of factorial of a number, permutation(nPr)& combination (nCr) with formula only
1.4.2 Binomial Theorem (without proof) for any index, simple problems on positive index only
1.4.3 General Term and Middle Term and problems
1.4.4 Expansion of $(1 + x)^{-1}$, $(1 - x)^{-1}$, where |x| < 1, exponential & logarithmic series only (no problem)

Module II **[7H]**

Determinants and Matrices Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.

Module III

Trigonometry **[10H]**

3.1 Concept of trigonometrical angles, measurement of angles in degree, radian and grade & their relation only.
3.2 Trigonometrical ratios of angles, associated angles, Trigonometric ratios of some standard angles, problems

3.3 Compound angles formula (without proof), multiple, sub-multiple angles & simple problems
3.4 Solutions of Trigonometrical Equations, simple problems (angle lies between 0 and 2π)
3.5 Inverse Circular Function & simple problems
3.6 Properties of triangle, basic formulae only

Module IV
Function, Limit & Continuity, Derivative

4.1 Function **[2H]**

4.1.1 Definition of variables & constants
4.1.2 Definition of function with examples, domain and range of a function
4.1.3 Types of functions (even-odd, increasing-decreasing, inverse, periodic) with simple examples
4.1.4 Graph of trigonometric functions, sin x, cos x, tan x only

4.2 Limit & Continuity **[2H]**

4.2.1 Definition of limit (with left hand limit & right hand limit), Fundamental Theorem on limit (only
statement), standard limits and simple problems
4.2.2 Continuity of functions, elementary test for continuity of functions (finite limit)

4.3 Derivative **[8H]**

4.3.1 Definition of derivatives
4.3.2 Derivatives of standard functions
4.3.3 Rules of differentiation of sum, difference, product and quotient of functions.
4.3.4 Derivatives of composite functions (Chain Rule)
4.3.5 Derivatives of inverse circular functions, implicit functions and logarithmic differentiation
4.3.6 Derivative of parametric functions, derivative of a function with respect to another function
4.3.7 Second order derivatives with simple problems
4.3.8 Application of derivatives –Physical & Geometrical interpretation of derivative, checking increasing-decreasing functions, finding velocity & acceleration, Maxima-Minima of function of single variable with simple problems.

Text Books

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics, Konch & Dey, Bhagabati Publication
3. Engineering Mathematics, Babu Ram, Pearson

Reference Books

1. Higher Algebra: Classical, S.K. Mapa, Sarat Book House
2. Introduction to Real Analysis, S.K. Mapa, Sarat Book House
3. Engineering Mathematics, Reena Garg, Khanna Publishing House, New Delhi

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Course Name: Applied Physics - I
Course Code: DPHYC101
Contact: 2L+1T
Credits: 3
Contact Hrs: 45

Module I: Physical world, Units and Measurements [11H]

Physical quantities; fundamental and derived, Units and systems of units (CGS and SI units),

Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis.

Measurements: Need, measuring instruments, least count, types of Measurement (direct, indirect), Errors in Measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures.

Module II: Force and Motion [10H]

Force, Momentum, Conservation of linear momentum, its applications such as recoil of gun, numerical problems rockets (concept only), Impulse and impulsive force.

Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period, relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical), concept of Centripetal and centrifugal forces with examples (No derivation, only formula) banking of roads and bending of cyclist, concept and formula and numerical problems.

Module III: Work, Power and Energy [6H]

Work: Concept and units, examples of zero work, positive and negative work

Friction: concept, types, laws of limiting friction, coefficient of friction, reducing friction and its engineering applications, Work done in moving an object on rough inclined plane.
Energy and its units, kinetic energy and potential energy, Conservation of mechanical energy for freely falling bodies(simple numerical problems), transformation of energy (examples only).
Power and its units, power and work relationship, calculation of power (numerical problems).

Module IV: Rotational Motion [6H]

Translational and rotational motion with examples, Definition of torque and angular momentum and their relation, Conservation of angular momentum (quantitative) and its applications.
Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only). Simple numerical problems.

Module V: Properties of Matter [6H]

Elasticity: definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-

strain curve.

Surface tension: Concept, units, cohesive and adhesive forces, angle of contact, Capillary rise (formula only), applications of surface tension, effect of temperature and impurity on surface tension.
Viscosity and coefficient of viscosity: terminal velocity, Stoke's law and effect of temperature on viscosity.

Hydrodynamics: Fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem (only formula and numericals) and its applications (mention name only).

Module VI: Heat and Thermometry [6H]

Concept of heat and temperature, basic concepts of measurements of heat and temperature, modes of heats transfer (conduction, convection and radiation with examples), Co-efficient of thermal conductivity simple numerical problems.
Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions of solids and relation amongst them, specific heats Cp & Cv of a gas and their relationship (Mention only).

Text Books

1. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
2. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi

Reference Books

1. Engineering Physics by DK Bhattacharya & Poonam Tandan; Oxford University Press, New Delhi
2. Comprehensive Practical Physics, Vol,I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi

Course Name: Applied Chemistry - I
Course Code: DCHMC101
Contact: 2L+1T
Credits: 3
Contact Hrs: 45

Module I: Atomic Structure, Chemical Bonding and Solutions [9H]

Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), and hydrogen spectrum explanation based on Bohr's model of atom, Heisenberg uncertainty principle, Quantum numbers - orbital concept. Shapes of s, p and d orbitals Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.

Type of chemical bonding: ionic, covalent, metallic and hydrogen bonds. Example of each type. Hybridization, sp3, sp2, sp, example: $BeCl_2$, BF_3, CH_4, NH_3, H_2O; structure of diamond, graphite.

Solution - idea of solute, solvent and solution, methods to express the concentration of solution- molarity (M = mole per liter), ppm, mass percentage, volume percentage and mole fraction.

Module II: Water [9H]

Graphical presentation of water distribution on Earth (pie or bar diagram). Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and simple numerical on water hardness.
Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), and quantitative measurement of water hardness by ETDA method, total dissolved solids (TDS) alkalinity estimation.
Water softening techniques - soda lime process, zeolite process and ion exchange process. Municipal water treatment (in brief only) - sedimentation, coagulation, filtration, sterilization.
Water for human consumption for drinking and cooking purposes from any water sources and enlist Indian standard specification of drinking water (collect data and understand standards).

Module III: Engineering Materials [9H]

Natural occurrence of metals - minerals, ores of iron, aluminium and copper, gangue (matrix), flux, slag, metallurgy - brief account of general principles of metallurgy. Extraction of iron from haematite ore using blast furnace, aluminium from bauxite along with reactions, reactions during copper extraction. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.
General chemical composition, composition based applications (elementary idea only details omitted): Port land cement and hardening, Glasses Refractory and Composite materials.
Polymers - monomer, homo and co polymers, degree of polymerization, simple reactions involved in preparation and their application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE, nylon - 6, nylon - 66, Bakelite only), rubber and vulcanization of rubber.

Module IV: Chemistry of Fuels and Lubricants [9H]

Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), calculation of HCV and LCV using Dulong's formula.
Proximate analysis and ultimate analysis of coal solid fuel petrol and diesel - fuel rating (octane and cetane numbers),
Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and biogas.
Lubrication - function and characteristic properties of good lubricant, classification with examples, lubrication mechanism - hydrodynamic and boundary lubrication, physical properties (viscosity and viscosity index, oiliness, flash and fire point, could and pour point only) and chemical properties (coke number, total acid number saponification value) of lubricants.

Module V: Electro Chemistry [9H]

Electronic concept of oxidation, reduction and redox reactions.
Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems.
Elementary concept of pH and buffer. Industrial Application of Electrolysis – Electrometallurgy, Electroplating, Electrolytic refining.
Application of redox reactions in electrochemical cells – Primary cells - dry cell,
Secondary cell - commercially used lead storage battery, fuel and Solar cells.
Introduction to Corrosion of metals – definition, types of corrosion (chemical and

electrochemical), H2 liberation and O2 absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.
Internal corrosion preventive measures – Purification, alloying and heat treatment and External corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organic inhibitors.

Text Books

1. Agarwal, & Shikha, Engineering Chemistry, Cambridge University Press; New Delhi, 2015.
2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.

Reference Books

1. G. H. Hugar & A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. l and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.
2. Rajesh Agnihotri, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.

Course Name: Communication Skills in English
Course Code: HU101
Contact: 2L
Credits: 2
Contact Hrs: 30

Module I: Communiucation [6H]

Basics of communication: Introduction, meaning and definition, process of communication etc.
Types of communication: formal and informal, verbal, non-verbal and written.
Barriers to effective communication 7 Cs for effective communication (considerate, concrete, concise, clear, complete, correct, courteous).

Art of Effective communication,
- Choosing words
- Voice
- Modulation
- Clarity
- Time
- Simplification of words

Technical Communication

Module II: Soft Skills for Professional Excellence [6H]

Introduction: Soft Skills and Hard Skills, Importance of Soft Skills.

Life skills: Self-awareness and Self-analysis, adaptability, social skills, emotional intelligence, Interpersonal relationship and empathy etc.

Applying soft skills across cultures – Corporate work culture, Work persona, Professionalism, Time Management

Case Studies

Module III: Reading Comprehension **[6H]**

Note Taking, Comprehension, vocabulary enhancement and grammar exercises based on reading of texts.

Module IV: Professional Writing **[6H]**

The art of writing Report and Memo CVs

Letters: Job Application and Business Drafting e-mail, minutes of a meeting, etc

Module V: Vocabulary and Grammar **[6H]**

Remedial Grammar and Exercises, Professional Workplace, Communication

Parts of speech, active and passive voice, tenses etc.

Course Name: Engineering Graphics
Course Code: DCES181
Contact: 3P
Credits: 1.5
Contact Hrs: 20

Module I: Letters and numerals (Single Stroke Vertical) **[3H]**

Conventions of lines and their applications

Concept of Representative Fraction (R.F), Reduced scale, Enlarged scale & Full Scale, Engineering Scale such as Plain Scale & Diagonal Scale.

Dimensional Techniques

Unidirectional System and Aligned System.

Module II: Geometrical Construction **[2H]**

a) Draw Regular Polygons, Ellipse, Parabola, hyperbola
b) Draw Curve passing through given no. of points, cycloid, involute of a circle and polygon

Module III: Orthographic Projection **[3H]**

Introduction to Orthographic Projection : Concept of First Angle & Third Angle of projection.
Projections of lines(limited to both ends in 1st quadrant) : parallel to the reference planes, inclined to the reference planes (1st Angle Method)
Projections of solid body: Regular Polygonal Pyramid, Cylinder, Cone - inclined to only one reference plane (1st Angle Method)

Module IV: Pictorial Projection **[3H]**

Conversion of Pictorial Views into orthographic views (Simple Objects &First Angle Projection Method Only)

Module V: Isometric Projection **[3H]**

Introduction to Isometric Projections, Concept of Isometric Scale and Isometric Views
Conversion of Orthographic views into Isometric Views/Projections : Simple Objects e.g. regular prism, pyramid, cone, cylinder.

Module VI: Engineering Element **[3H]**

Free hand sketches of engineering elements such as thread profile, nuts, bolts, studs, set screws, washers, locking arrangements etc. and their conventional representation (For branches other than Mechanical Engineering, the teachers should select branch specific elements for free hand sketching)

Module VII: AutoCAD **[3H]**

Introduction to different commands and toolbars of AutoCAD

a) Draw command : Lines, Circle, Polygon, Arc, Ellipse, Polyline, Fillet, Chamfer, Hatch, Array (Rectangular & Polar) etc.
b) Modify Command : Offset, Trim, Extend, Erase, Fillet, Chamfer, Break, Lengthen, Copy, Move, Mirror, Stretch, Match Properties, Pedit etc.
c) View : Zoom All, Zoom Window, Zoom Extent etc.
d) Dimensioning : Dimension Setting, Linear, Aligned, Radial, Diameter, Leader, Angular etc.
e) Text : Text Style, Dtext, Mtext, DDedit etc.
f) Format : Limits, Layers, Pan etc.

Making a few simple 2D drawings in AutoCAD.

Text Books

1. N.D.Bhatt, Engineering Drawing, 53rd Edition, Charotkar Publishing House
2. R.K.Dhawan, Engineering Drawing, Revised Edition 2015, S.Chand & Co.

Reference Books

1. S.P.Dey, AutoCAD 2014, Vikas Publisher
2. P.S. Gill, Engineering Drawing, S.K.Kataria & Sons.

Course Name: Engineering Workshop Practice
Course Code: DMES181
Contact: 3P
Credits: 1.5
Contact Hrs: 20

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Module I: Electrical Wiring

- Safety precautions to be followed in Electrical Works
- Electric shock, methods of shock treatment
- Safety measure: Earthing, Fuse, circuit breakers, etc.
- Different types of wire-gauge & strands and their applications
- Different tools used in Electrical wiring works
- General wiring accessories & their uses.
- Types of switches and their application.
- Types of wiring and joints.

Practical (any three)- Group works

1. Study/ demonstration of single phase electrical service connection from pole to house including consumer installation.
2. Study of different types of wiring and connection of Single Phase Motor (Fan).
3. Circuits for one lamp controlled by one switch by surface conduit wiring,
4. Lamp circuits- connection of lamp and socket by separate switches, Connection of Fluorescent lamp/tube light,
5. Simple lamp circuits- install bedroom lighting
6. Simple lamp circuits- install stair case wiring.
7. Wiring of calling-bell

Module II: Fitting

- Demonstration of different tools and equipment used in fitting shop.
- Study of different precious measuring instrument such as micrometer, vernier calipers, bevel protectors.
- Care and maintenance of the above mentioned tools and equipment.
- Study of drilling machines and power tools used in fitting shop.
- Safety measure to be followed in Fitting shop.

Practical/ Demonstration

1. Demonstration of different fitting job operations like chipping, filing, drilling, tapping, sawing, cutting etc.

Job Preparation -Individual Works

1. One simple fitting job involving practice of chipping, filing, marking, drilling, tapping, cutting etc.

Module III: Welding

- Purpose of welding, advantages & disadvantages of it over other joining processes.
- Types of welding processes (in brief)
- Specification, usage, care & maintenance of various welding machines, tools & equipment used in the shop.
- Selection of welding methods and electrodes.
- Safety measures & equipment required while working in welding shop.

Job Preparation (Any One)

- Individual Works
- Job 1 – Butt Joint
- Job 2 – Lap Joint
- Job 3 – 'T' Joint

Module IV: Carpentry

- Raw materials used in carpentry shop: wood & alternative materials.
- Specification, usage, care & maintenance of various tools, equipment and machineries used in the Carpentry shop.
- Types of wood. Difference between hard and soft wood.
- Timber: characteristics, usage and defects. Difference between wood and timber.
- Seasoning of wood.
- Different types of joints such as cross half-lap joint, through tenon and mortise joint, dove tail joints, etc.
- Safety measures to be taken in carpentry shop.

Practical/Demonstration

1. Demonstration of use of different tools, equipment and machineries.
2. Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc.

Job Preparation -Individual Works

1. One simple job involving any one joint.

Module V: Sheet Metal Working

- Briefing on different types of sheet metal, like Stainless Steel Sheet Metal, Copper Sheet Metal, Brass Sheet Metal, Corrugated Sheet Metal, Galvanized Sheet Metals etc., and their uses.
- Demonstration of different types of Tools & machines and their use in sheet metal work.
- Demonstration of different types sheet metal joints and their applications.
- Demonstration of different types of sheet metal working: cold working, hot working, warm working, bending, drawing, end curling, shearing, piercing, sheet metal presses, etc.
- Sheet metal joining operation like welding, brazing, soldering and riveting.
- Safety measure to be followed in sheet metal work.

Practical

1. Making of any simple job(example: sheet metal mug) involving different sheet petal operations including soldering and riveting.

Text Books

1. S.K. Hazra Chaudhary, Workshop Technology, Volume I&II, Media Promoters and Publishers, Mumbai.
2. B.S. Raghuwanshi, Workshop Technology, Volume I&II, DhanpathRai and Sons, New Delhi 2014

Reference Books

1. H.S. Bawa, Workshop Practice, Mcgrawhill HED
2. R.P. Singh, Electrical Workshop: Safety, Commissioning, Maintenance & Testing of Electrical Equipment, Wiley

Course Name: Applied Physics-I Lab
Course Code: DPHYC191
Contact: 2P
Credits: 1
Contact Hrs: 15

List of Practical's/Activities (To perform minimum 8 practical's)

1. To measure the volume of the material of a given hollow cylinder, using a Vernier calipers.
2. To determine the area of cross section of a thin wire using a screw gauge.
3. To determine radius of curvature of a convex and a concave mirror/ surface using a spherometer.
4. To find the co-efficient of friction between wood and glass using a horizontal board.
5. To determine force constant of a spring using Hook's law.
6. To find the moment of inertia of a flywheel.
7. To find the viscosity of a given liquid (Glycerin) by Stoke's law
8. To find the co-efficient of linear expansion of the material of a rod.
9. To verify Boyle's law.
10. To determine the relative density of sand by using a sp. gr. Bottle.

Text Books

1. Physics for Class-XI & XII (Part-I & II); N.C.E.R.T., Delhi.
2. Comprehensive Practical Physics, Vol-I & II, JN Laxmi Publications (P) Ltd.

Reference Books

1. Practical Physics by C.L. Arora, S. Chand Publication.
2. Optics, Ghatak, McGraw Hill Education India Private Limited

Course Name: Applied Chemistry Lab
Course Code: DCHMC191
Contact: 2P
Credits: 1
Contact Hrs: 15

Perform any 12 (twelve) Laboratory Practicals

Volumetric and Gravimetric analysis

1. Preparation of standard oxalic acid and standard potassium dichromate solution.

2. To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution and phenolphthalein as indicator.

3. Standardization of potassium permanganate solution using standard oxalic acid and determination of percentage of iron present in given Hematite ore by KMnO4 solution

4.

a) Standardization of sodium thiosulphate using standard potassium dichromate solution by IODOMETRY.

b) Iodometric estimation of copper in copper pyrite ore.

5. Volumetric estimation of total acid number (TAN) of given oil.

6. Volumetric estimation of

a) Total hardness of given water sample using standard EDTA solution.

b) Alkalinity of given water sample using 0.01N sulphuric acid.

7. Proximate analysis of coal

a) Gravimetric estimation moisture in given coal sample.

b) Gravimetric estimation ash in given coal sample

Instrumental analysis

8. Determine the conductivity of given water sample.

9. Determination of the Iron content in given cement sample using colorimeter.

10. Determination of viscosity of lubricating oil using Redwood viscometer.

11. Determination of flash and fire point of lubricating oil using Able's flash point apparatus.

12. To verify the first law of electrolysis of copper sulfate using copper electrode.

13. Construction and measurement of emf of electrochemical cell (Daniel cell).

14. To study the effect of dissimilar metal combination on cell emf.

15. To apply thin layer chromatography for separation of mixture of inorganic/organic compounds.

16. Qualitative detection of ARSENIC in a given sample of water (~5 ppm solution of sodium arsenite)

17. Determination of dissolved oxygen in a sample of water.

18. Determination of pH value of unknown solution.

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Course Name: Sports and Yoga
Course Code: DCSTS101
Contact: 2P
Credits: 1
Contact Hrs: 15

Module I: Introduction to Physical Education [1H]

- Meaning & definition of Physical Education
- Aims & Objectives of Physical Education
- Changing trends in Physical Education

Module II: Olympic Movement [2H]

- Ancient & Modern Olympics (Summer & Winter)
- Olympic Symbols, Ideals, Objectives & Values
- Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

Module III: Physical Fitness, Wellness & Lifestyle [1H]

- Meaning & Importance of Physical Fitness & Wellness
- Components of Physical fitness
- Components of Health related fitness
- Components of wellness
- Preventing Health Threats through Lifestyle Change
- Concept of Positive Lifestyle
- Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga
- Define Anatomy, Physiology & Its Importance
- Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respi- ratory System, Neuro-Muscular System etc.)

Module IV: Kinesiology, Biomechanics & Sports [1H]

- Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports
- Newton's Law of Motion & its application in sports.
- Friction and its effects in Sports.

Module V: Postures [1H]

- Meaning and Concept of Postures.
- Causes of Bad Posture.
- Advantages & disadvantages of weight training.
- Concept & advantages of Correct Posture.
- Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Ky-phosis, Bow Legs and Scoliosis.
- Corrective Measures for Postural Deformities

Module VI: Yoga [1H]

- Meaning & Importance of Yoga

- Elements of Yoga
- Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas
- Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Sha-shankasana)
- Relaxation Techniques for improving concentration - Yog-nidra

Module VI: Yoga & Lifestyle [2H]

- Asanas as preventive measures.
- Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana.
- Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana.
- Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana.
- Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana.
- Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

Module VII: Training and Planning in Sports [1H]

- Meaning of Training
- Warming up and limbering down
- Skill, Technique & Style
- Meaning and Objectives of Planning.
- Tournament – Knock-Out, League/Round Robin & Combination.

Module VIII: Psychology & Sports [1H]

- Definition & Importance of Psychology in Physical Edu. & Sports
- Define & Differentiate Between Growth & Development
- Adolescent Problems & Their Management
- Emotion: Concept, Type & Controlling of emotions
- Meaning, Concept & Types of Aggressions in Sports.
- Psychological benefits of exercise.
- Anxiety & Fear and its effects on Sports Performance.
- Motivation, its type & techniques.
- Understanding Stress & Coping Strategies.

Module IX: Doping [1H]

- Meaning and Concept of Doping
- Prohibited Substances & Methods
- Side Effects of Prohibited Substances

Module X: Sports Medicine [1H]

- First Aid – Definition, Aims & Objectives.
- Sports injuries: Classification, Causes & Prevention.
- Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries

Module XI: Sports / Games **[2H]**

Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc.

- History of the Game/Sport.
- Latest General Rules of the Game/Sport.
- Specifications of Play Fields and Related Sports Equipment.
- Important Tournaments and Venues.
- Sports Personalities.
- Proper Sports Gear and its Importance.

Text Books

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Light On Yoga By B.K.S. Iyengar.

References Books

1. Health and Physical Education – NCERT (11th and 12th Classes)

Course Name: Communication Skills in English Lab
Course Code: HU191
Contact: 2P
Credits: 1
Contact Hrs: 15

Module I **[3H]**
Basic Common Communication Problems and their Solutions

Module II **[3H]**
Introduction to Phonetics
Sounds: consonant, vowel. Transcription of words (IPA), weak forms etc.

Module III **[6H]**
Speaking and Listening Skills
Standard and Formal Speech: Oral presentations, Group Discussions, Public Speaking, Business presentations etc. Conversation practice and role playing, Job interviews, Note taking etc.

Module IV **[3H]**
Non-verbal Communication
Proxemics, Haptics and Kinesics

Swami Vivekananda University
School of Computer Science and Engineering
Programme: Diploma in Computer Science and Technology

Semester II

Course Name: Mathematics-II
Course Code: DEMA202
Contact: 3L+1T
Credits: 4
Contact Hrs: 60

Module I **[12H]**

Definition of vector and types of vectors Concept of a position vector and Ratio formula& simple problems Rectangular resolution of a vector Equality, addition, subtraction of vectors and multiplication of a vector by a scalar Scalar (dot) and Vector (cross) product of two vectors with properties & simple problems Application of dot product -- work done by a force, projection of a vector upon another Application of cross product -- finding area of a triangle and parallelogram, moment of a force

Module II **[12H]**

Integral Calculus Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Use of formulas, and for solving problems Where m and n are positive integers. Applications of integration for i. Simple problem on evaluation of area bounded by a curve and axes. ii. Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).

Module III **[12H]**

Co-Ordinate Geometry Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula. General equation of a circle and its characteristics. To find the equation of a circle, given: i. Centre and radius, ii. Three points lying on it and iii. Coordinates of end points of a diameter; Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Problems on conics when their foci, directories or vertices are given.

Module IV **[12H]**

Vector Algebra Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity

Module V **[12H]**

Differential Equations Solution of first order and first-degree differential equation by variable separation method (simple problems). MATLAB – Simple Introduction.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.

References Books

1. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
2. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

Swami Vivekananda University
School of Computer Science and Engineering
Programme: Diploma in Computer Science and Technology

Course Name: Applied Physics-II
Course Code: DPHYC201
Contact: 2L+1T
Credits: 3
Contact Hrs: 45

Module I **[7H]**

Wave motion and its applications Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, Sound and light waves and their properties, wave equation ($y = r \sin\omega t$) amplitude, phase, phase difference, principle of superposition of waves and beat formation. Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency etc. Simple harmonic progressive wave and energy transfer, study of vibration of cantilever and determination of its time period, Free, forced and resonant vibrations with examples. Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications, Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.

Module II **[6H]**

Optics Basic Optical laws; reflection and refraction, refractive index, Images and image formation by mirrors, lens and thin lenses, lens formula, power of lens, magnification and defects. Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber. Optical Instruments; simple and compound microscope, astronomical telescope in normal adjustment, magnifying power, resolving power, uses of microscope and telescope, optical projection systems.

Module III **[6H]**

Electrostatics Coulombs law, unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference, Gauss law: Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere. Capacitor and its working, Types of capacitors, Capacitance and its units. Capacitance of a parallel plate capacitor, Series and parallel combination of capacitors (related numerical), dielectric and its effect on capacitance, dielectric break down.

Module IV **[7H]**

Current Electricity Electric Current and its units, Direct and alternating current, Resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistances and colour coding. Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge and its applications (slide wire bridge only), Concept of terminal potential difference and Electro motive force (EMF) Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy

Module V **[6H]**

Electromagnetism Types of magnetic materials; dia, para and ferromagnetic with their properties, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization. Concept of electromagnetic induction, Faraday's Laws, Lorentz force

(force on moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field. Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.

Module VI **[7H]**

Semiconductor Physics Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes. Diode as rectifier – half wave and full wave rectifier (centre taped). Transistor; description and three terminals, Types- pnp and npn, some electronic applications (list only). Photocells, Solar cells; working principle and engineering applications.

Module VII **[6H]**

Modern Physics Lasers: Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, optical feedback, Types of lasers; Ruby, He-Ne and semiconductor, laser characteristics, engineering and medical applications of lasers. Fiber Optics: Introduction to optical fibers, light propagation, acceptance angle and numerical aperture, fiber types, applications in; telecommunication, medical and sensors. Nanoscience and Nanotechnology: Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology, nanotechnology based devices and applications.

Text Books

1. Introduction to Electrodynamics, David J. Griffiths, Pearson Education India, Learning Private Limited
2. Principles of Physics, 10ed, David Halliday, Robert Resnick Jearl Walker , Wiley

Reference Books

1. Electricity, Magnetism, and Light, Wayne M. Saslow, Academic Press
2. Engineering Mechanics (In SI Units) (SIE), S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Pati , McGraw Hill Education

Course Name: Introduction to IT Systems
Course Code: DCSTC201
Contact: 2L
Credits: 2
Contact Hrs: 30

Module I **[6H]**

Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals. General understanding of various computer hardware components – CPU, Memory, Display, Keyboard, Mouse, HDD and other Peripheral Devices.

Module II **[6H]**
OS Installation (Linux and MS Windows), Unix Shell and Commands, vi editor

Module III **[6H]**

HTML4, CSS, making basic personal webpage.

Module IV **[6H]**
Office Tools: OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress.

Module V **[6H]**
Information security best practices. Class lectures will only introduce the topic or demonstrate the tool, actual learning will take place in the Lab by practicing regularly.

Text Books

1. R.S. Salaria, Computer Fundamentals, Khanna Publishing House
2. Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House

References Books

1. Online Resources, Linux man pages, Wikipedia
2. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett

Course Name: Fundamentals of Electrical & Electronics Engineering
Course Code: DECEE201
Contact: 2L+1T
Credits: 3
Contact Hrs: 45

Module I: Overview of Electronic Components & Signals **[7H]**

Passive Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and CMOS and their Applications. Signals: DC/AC, voltage/current, periodic/non-periodic signals, average, rms, peak values, different types of signal waveforms, Ideal/non-ideal voltage/current sources, independent/dependent voltage current sources.

Module II: Overview of Analog Circuits **[7H]**

Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop configurations, Application of Op-Amp as amplifier, adder, differentiator and integrator.

Module III: Overview of Digital Electronics **[8H]**

Introduction to Boolean Algebra, Electronic Implementation of Boolean Operations, Gates-Functional Block Approach, Storage elements-Flip Flops-A Functional block approach, Counters: Ripple, Up/down and decade, Introduction to digital IC Gates (of TTL Type).

Module IV: Electric and Magnetic Circuits **[8H]**

EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically induced emf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits.

Module V: A.C. Circuits [8H]

Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; Voltage and Current relationship in Star and Delta connections; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, R-L-C series and parallel circuits; Power in A. C. Circuits, power triangle.

Module VI: Transformer and Machines [7H]

General construction and principle of different type of transformers; Emf equation and transformation ratio of transformers; Auto transformers; Construction and Working principle of motors; Basic equations and characteristic of motors.

Text Books

1. Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5

References Books

1. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353
2. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924405

Course Name: Engineering Mechanics
Course Code: DMES201
Contact: 2L+1T
Credits: 3
Contact Hrs: 45

Module I: Basics of mechanics and force system [11H]

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units. Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification. Resolution of a force - Orthogonal components of a force, moment of a force, Varignon's Theorem. Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

Module II: Equilibrium Equilibrium and Equilibrant [12H]

Free body and Free body diagram, Analytical and graphical methods of analysing equilibrium

Lami's Theorem – statement and explanation, Application for various engineering problems. Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple), Beam reaction for cantilever, simply supported beam with or without overhang – subjected to combination of Point load and uniformly distributed load. Beam reaction graphically for simply supported beam subjected to vertical point loads only.

Module III: Centroid and centre of gravity [11H]

Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle) Centroid of composite figures composed of not more than three geometrical figures Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere) Centre of Gravity of composite solids composed of not more than two simple solids.

Module IV: Simple lifting machine [11H]

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel, Single purchase and double purchase crab winch, Simple screw jack, Weston's differential pulley block, geared pulley block.

Text Books

1. D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008)
2. Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.

Reference Books

1. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
2. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.

Course Name: Applied Physics-II Lab
Course Code: DPHYC291
Contact: 2P
Credits: 1
Contact Hrs: 15

Experiments in Optics

1. Determination of dispersive power of the material of a prism
2. Determination of wavelength of a monochromatic light by Newton's ring
3. Determination of wavelength of a monochromatic light by Fresnel's bi-prism
4. Determination of wavelength of the given laser source by diffraction method
5. Electricity & Magnetism experiments
6. Determination of thermo electric power of a given thermocouple.
7. Determination of specific charge (e/m) of electron by J.J. Thompson's method.
8. Determination of dielectric constant of a given dielectric material.
9. Determination of Hall coefficient of a semiconductor by four probe method.
10. To study current voltage characteristics, load response, areal characteristic and spectral

response of a photovoltaic solar cell.
11. Determination of resistance of ballistic galvanometer by half deflection method and study of variation of logarithmic decrement with series resistance.
12. Determination of unknown resistance using Carey Foster's bridge
13. Study of Transient Response in LR, RC and LCR circuits using expeyes
14. Generating sound from electrical energy using expeyes

Experiments in Quantum Physics

1. Determination of Stefan-Boltzmann constant.
2. Determination of Planck constant using photocell.
3. Determination of Lande-g factor using Electron spin resonance spectrometer.
4. Determination of Rydberg constant by studying Hydrogen spectrum.
5. Determination of Band gap of semiconductor.
6. To study current voltage characteristics, load response, areal characteristic and spectral response of a photovoltaic solar cell.

Miscellaneous experiments

1. Determination of Young's modulus of elasticity of the material of a bar by the method of flexure
2. Determination of bending moment and shear force of a rectangular beam of uniform cross-section
3. Determination of modulus of rigidity of the material of a rod by static method
4. Determination of rigidity modulus of the material of a wire by dynamic method
5. To determine the moment of inertia of a body about an axis passing through its centre of gravity and to determine the modulus of rigidity of the material of the suspended wire
6. Determination of coefficient of viscosity by Poiseulle's capillary flow method

Course Name: Introduction to IT Systems Lab
Course Code: DCSTC291
Contact: 4P
Credits: 2
Contact Hrs: 30
Module- I: DOS and UNIX

Week – 1: DOS Operating System and its basic commands.
Week – 2: UNIX Operating System and its basic commands.

Module- II: WINDOWS

Week – 3: Windows Operating System and its basic applications.

Module- III: Word Processing Software

Week – 4: Introduction to Word Processing and its applications.
Week – 5: Introduction to Word Processing and its applications. Week – 6: Introduction to Word Processing and its applications.

Module- IV: Spreadsheet

Week – 7: Introduction to Spreadsheet and its applications.
Week – 8: Introduction to Spreadsheet and its applications.
Week – 9: Introduction to Spreadsheet and its applications.

Module- V: Presentation Software

Week – 10: Introduction to Presentation and its applications.
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Module- VI: HTML

Week – 11: Basic HTML Tags.
Week – 12: HTML Forms

Course Name: Fundamentals of Electrical & Electronics Engineering Lab
Course Code: DECEE291
Contact: 2P
Credits: 1
Contact Hrs: 15

1. Verification of Kirchhoff's laws
2. Verification of All Theorems (Thevenin's theorem, Norton's theorem, Maximum power transfer theorem)
3. Transient analysis of RL an RC series circuits
4. Load test on single phase transformer
5. Demo of DC/AC machines & Parts
6. Types of wiring (fluorescent lamp wiring, staircase wiring)
7. Characteristics of semiconductor devices (PN junction, Zener diode, BJT)
8. Wave shaping circuits (Half and full wave rectifier, clipper)
9. Displacement measurement using LVDT and pressure measurement using Strain gauge
10. Verification and interpretation of Logic Gates.
11. Reduction of Boolean expression using K-map 12. Study of modulation and demodulation techniques.

Course Name: Engineering Mechanics Lab
Course Code: DMES291
Contact: 2P
Credits: 1
Contact Hrs: 15

Module I: Smithy/Forging

- Purpose of Smithy / Forging Works
- Different types of Hearths used for Smithy / Forging works
- Specification, usage, care and maintenance of various tools and equipment used in the shop.
- Types of raw materials used in Smithy / Forging shop & their required temperature for

it.

- Types of fuel used in hearth and the respective maximum temperature obtained.
- Uses of Fire Bricks & Clays in Smithy/Forging Work Shop.
- Types of heat treatment processes involved in Smithy / Forging shop and its effect on forged items.
- Hot forge & cold forge utility.
- Safety measures & equipment required while working in Smithy / Forging Shop

Practical/ Demonstration

1. Practice / Demonstration of firing of hearth / Furnace, Cleaning of Clinkers and Temperature Control of Fire.
2. Practice / Demonstration on different basic Smithy / Forging operations such as Upsetting, Drawing down, Setting down, Necking, Cutting, Bending, Fullering, Swaging, Punching and Drifting etc.
3. Demonstration on making of Cube, hexagonal cube, hexagonal bar from round bar.
4. Hexagonal /octagonal flat chisel including tempering of edges.

Module II: Machine shop Practice

- Purpose of a machine shop/ workshop in industry.
- Demonstration of all available tools & tackles of machine shop.
- Inculcation of basic idea of machine tool; differentiation between machine & machine tool.
- Familiarization of all machine tools in the machine shop.
- Safety precautions for working in a machine shop.

Practice in Machine Shop

1. Identification of different parts of a lathe and utility of those parts.
2. Demonstration of all possible machining operation on a lathe, e.g. turning, facing, parting, taper turning, drilling, threading etc.
3. Demonstration to operate a drilling machine or shaping machine and identifying different parts of that m/c tool.

Job Practice-(Individual work)

1. Preparation of one job in Lathe, involving simple machining operations (e.g. turning, facing, grooving, threading, knurling etc.).

Module III: Electronic Shop

- Discussion on active and passive electronic components.
- Discussion on soldering and its use.
- Introduction on multi-meter and its use.
- Discussion on use of test equipment in fault finding.
- Discussion on resistor, capacitor, amplifiers, relay, diodes, zener diode and LEDs.
- Safety measure to be followed in electronic shop.

Practical/ Demonstration

1. Familiarization, identification and testing of active and passive components.
2. Soldering and de-soldering practice.
3. Use of Multi meter (both Analog and digital).
4. Demonstration of resistor, capacitor, amplifiers, relay, diodes, zener diode and LEDs.

Module IV: Demonstration

Following demonstration may be conducted:

1. Demonstration of measurement of Current, Voltage, Power and Energy for an electrical system/ wiring.
2. Demonstration of advanced power tools such as pneumatic tools, electrical portable grinding tools and accessories.
3. Demonstration of bourdon tube pressure gauge.
4. Demonstration of ball bearing and roller bearing.
5. Demonstration of portable power tools for Cutting and drilling, etc.

Course Name: Environmental Science
Course Code: DEVSC201
Contact: 2L
Credits: 0
Contact Hrs: 30

Module I **[5H]**

Basic ideas of environment, basic concepts, man, society & environment, their interrelationship Mathematics of population growth and associated problems, Importance of population study in Environmental engineering, definition of resource, types of resource, renewable, non-renewable, potentially renewable, effect of excessive use vis-à-vis population growth, Sustainable Development.

Module II **[5H]**

Materials balance: Steady state conservation system, steady state system with non-conservative pollutants, step function. Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management; Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering. Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function.

Module III **[5H]**

Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban); Food chain [definition and one example of each food chain], Food web. Biogeochemical Cycle-definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur].

Module IV **[5H]**

Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity. Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere, Tropopause and Mesopause. Energy balance: Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems. Green house effects: Definition, impact of greenhouse

gases on the global climate and consequently on sea water level, agriculture and marine food. Global warming and its consequence, Control of Global warming. Earth's heat budget.

Module V **[5H]**

Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion). Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model. Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant. Sources and effect of different air pollutantsSuspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. Smog, Photochemical smog and London smog. Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green-house gases, effect of ozone modification.

Module VI **[5H]**

Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference). Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds. River/Lake/ground water pollution: River: DO, 5-day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river [deoxygenation, reaeration], COD, Oil, Greases, pH. Lake: Eutrophication [Definition, source and effect].

Text books

1. M.P. Poonia & S.C. Sharma, Environmental Studies, Khanna Publishing House (AICTE Recommended Textbook – 2018)
2. Masters, G. M., "Introduction to Environmental Engineering and Science", Prentice-Hall of India Pvt. Ltd.,1991.

Reference books

1. De, A. K., "Environmental Chemistry", New Age International
2. Environmental Science: Toward a Sustainable Future Book by Dorothy F. Boorse and Richard T. Wright

Semester III

Course Name: Computer Programming
Course Code: DCSTC301
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction to Problem Solving (computational way of thinking); Variables and Representation. Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.
From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

Module II **[9H]**

Arithmetic, Relational, Logical and Bitwise Operators; Input, Output, Formatting and File I/O, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops

Module III **[9H]**

Conditional Statements, Repeat Statements, Loops and Nested Loops Arrays and Memory, Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms on Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Module IV **[9H]**

Organization, Strings, Multidimensional Arrays, Functions and Parameter Passing, Function: Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Module V **[9H]**

Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)
Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.
Structure: Structures, Defining structures and Array of Structures

Text Books

1. Let Us C, Yashavant Kanetkar
2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House

Reference books

1. C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
2. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India

Course Name: Computer Programming Lab
Course Code: DCSTC391
Contact: 3P
Credits: 2
Contact Hrs: 30

1. Familiarization with programming environment (Editor, Compiler, etc.)
2. Programs using I/O statements and various operators
3. Programs using decision making statements and branching statements
4. Programs using loop statements
5. Programs to demonstrate applications of n dimensional arrays
6. Programs to demonstrate use of string manipulation functions
7. Programs to demonstrate parameter passing mechanism

8. Programs to demonstrate recursion
9. Programs to demonstrate use of pointers
10. Programs to demonstrate command line arguments
11. Programs to demonstrate dynamic memory allocation

Course Name: Data Structures
Course Code: DCSTC302
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I: Basic Terminologies [11H]

Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off.
Searching: Linear Search and Binary Search Techniques and their complexity

Module II: Stacks and Queues [12H]

ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis.
ADT, queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each type of Queue: Algorithms and their analysis.

Module III: Linked Lists [11H]

Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list;
Linked representation of Stack and Queue, Header nodes, doubly linked list: operations on it and algorithmic analysis;
Circular Linked Lists: all operations their algorithms and the complexity analysis.

Module IV: Trees [11H]

Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

Text Books

1. Data Structures And Program Design In C, 2/E by Robert L. Kruse, Bruce P. Leung.
2. Fundamentals of Data Structures of C" by Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.

Reference Books

1. Data Structures in C by Aaron M. Tenenbaum.
2. Data Structure by S. Lipschutz.

Course Name: Data Structures Lab
Course Code: DCSTC392

Contact: 3P
Credits: 2
Contact Hrs: 30

1. Implementation of data structure operations (Insertion, deletion, traversing, searching) on array. Linear search, Binary search.

2. Implementation of stack, queue operation using array. Pop, Push, Insertion, deletion, Implementation of circular queue. Infix to postfix conversion, postfix expression evaluation

3. Implementation of linked lists: Single linked list, circular linked list, double linked list, doubly circular linked list.
4. Implementation of stack and queue using linked list. Merging two linked list, Linked list representation of a polynomial, polynomial addition, polynomial multiplication.

5. Tree: creating Binary Search tree, recursive and non-recursive traversal of BST, deletion in BST, calculating height of a BST, building AVL tree.

Course Name: Computer System Organization
Course Code: DCSTC303
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[11H]**

Basic organization of the stored program computer and operation sequence for execution of a program. Role of operating systems and compiler/assembler. Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format. Instruction sets and addressing modes.

Module II **[12H]**

Commonly used number systems. Fixed and floating point representation of numbers. Overflow and underflow. Design of adders – ripple carry and carry look ahead principles. Design of ALU. Fixed point multiplication -Booth's algorithm. Fixed point division - Restoring and non-restoring algorithms. Floating point - IEEE 754 standard.

Module III **[11H]**

Memory unit design with special emphasis on implementation of CPU-memory interfacing. Memory organization, static and dynamic memory, memory hierarchy, associative memory. Cache memory, Virtual memory. Data path design for read/write access.

Module IV **[11H]**

Design of control unit - hardwired and microprogrammed control. Introduction to instruction pipelining. Introduction to RISC architectures. RISC vs CISC architectures. I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA.

Text Books

1. Mano, M.M., "Computer System Architecture", PHI.
2. Behrooz Parhami "Computer Architecture", Oxford University Press

Reference Books

1. Hayes J. P., "Computer Architecture & Organisation", McGraw Hill,
2. Hamacher, "Computer Organisation", McGraw Hill,

Course Name: Algorithms
Course Code: DCSTC304
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[5H]**

Sorting: Review of various sorting algorithms, topological sorting Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkasra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

Module II **[5H]**

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set, Application to MST.

Module III **[5H]**

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path. Flow-Networks: Maxflow-mincut theorem, FordFulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Module IV **[5H]**

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

Module V **[5H]**

Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.

Module VI **[5H]**

Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

Module VII **[5H]**

Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm.

Module VIII **[5H]**

Linear Programming: Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness. One or more of the following topics based on time and interest

Module IX **[5H]**

Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm, Recent Trands in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.

Text Books

1. Introduction to Algorithms by Cormen, Leiserson, Rivest, Stein.
2. The Design and Analysis of Computer Algorithms by Aho, Hopcroft, Ullman.

Reference Books

1. Algorithm Design by Kleinberg and Tardos.
2. Design & Analysis of Algorithms, Gajendra Sharma, Khanna Publishing House, New Delhi

Semester IV

Course Name: Operating Systems
Course Code: DCSTC401
Contact: 3L
Credits: 3

Swami Vivekananda University
School of Computer Science and Engineering
Programme: Diploma in Computer Science and Technology

Contact Hrs: 45

Module I **[9H]**

Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Module II **[9H]**

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Module III **[9H]**

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problemetc.

Module IV **[9H]**

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Module V **[9H]**

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation– Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation –Page allocation Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently

Text Books

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

Reference Books

1. Operating System Concepts, Ekta Walia, Khanna Publishing House (AICTE Recommended Textbook – 2018)
2. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin

Publishing

Course Name: Operating Systems Lab
Course Code: DCSTC491
Contact: 3P
Credits: 2
Contact Hrs: 30

1. Managing Unix/Linux Operating System : Creating a bash shell script, making a script executable, shell syntax (variables, conditions, control structures, functions, commands). Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Backup schedules and methods Kernel loading, init and the inittab file, Run-levels, Run level scripts. Password file management, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user-management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users &user groups.

2. Process: starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.

3. Signal: signal handling, sending signals, signal interface, signal sets.

4. Semaphore: programming with semaphores (use functions semctl, semget,semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).

5. POSIX Threads: programming with pthread functions (viz. pthread_create, pthread_join, pthread_exit, pthread_attr_init, pthread_cancel)

6. Inter-process communication: pipes(use functions pipe, popen, pclose), named pipes(FIFOs, accessing FIFO), message passing & shared memory(IPC version V).

Course Name: Introduction to DBMS
Course Code: DCSTC402
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction; Database System Concepts and Architecture
Database system architecture: Data Abstraction, Data Independence, Data Definition Language(DDL),Data Manipulation Language(DML).

Module II **[9H]**

Data Modeling using the Entity-Relationship Model; The Enhanced Entity-Relationship (EER) model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Storage strategies: Indices, B-trees, hashing. Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multiversion and optimistic Concurrency Control schemes, Database recovery.

Module III **[9H]**

The Relational Data Model and Relational Database Constraints; ER/EER to Relational Model map- ping; Relational Algebra and Relational Calculus Techniques,
Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQLserver.
Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

Module IV **[9H]**

Functional dependencies and normalization for relational databases; Relational database design algorithms and further dependencies.
Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Module V **[9H]**

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.
Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Text Books

1. Fundamentals of Database Systems, Elmasri & Navathe, Pearson Education
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata McGraw-Hill.

Reference Books

1. Database System Concepts, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw- Hill, New Delhi, India.
2. Introduction to Database Systems, C.J.Date, Pearson Education

Course Name: Introduction to DBMS Lab
Course Code: DCSTC492
Contact: 3P
Credits: 2
Contact Hrs: 30

Case Study-1: Employee database – 'Create' employee table, 'Select' and display an em- ployee matching a given condition, 'Delete' duplicate records, delete rows using triggers,

Case Study-2: Visitor Management database

Case Study-3: Students Academic database

Case Study-4: Inventory Management System database

Case study-5: Bank Operations database

Case Study-6: Bus Operator (Roadways) – Do related activities such as prepare E-R Mod- el, Relational Model, do Normalisation, Create Tables, Insert data, Delete Data, Query da- tabase, create stored procedures, etc.

Course Name: Computer Networks
Course Code: DCSTC403
Contact: 3L
Credits: 2
Contact Hrs: 30

Module I **[4H]**

Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media,

Module II **[4H]**

LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN,

Module III **[4H]**

Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

Module IV **[4H]**

Data Link Layer and Medium Access Sub Layer: Error Detection and Error, Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA,CSMA/CD,CDMA/CA

Module V **[4H]**

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Module VI **[4H]**

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service,

Module VII **[2H]**

QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

Module VIII **[4H]**

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

Text Books

1. Introduction to Algorithms by Cormen, Leiserson, Rivest, Stein.
2. The Design and Analysis of Computer Algorithms by Aho, Hopcroft, Ullman.

Reference Books

1. Algorithm Design by Kleinberg and Tardos.
2. Design & Analysis of Algorithms, Gajendra Sharma, Khanna Publishing House, New Delhi

Course Name: Distributed System
Course Code: DCSTD401A
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.
Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non-token based algorithms, Performance metric for distributed mutual exclusion algorithms.

Module II **[9H]**

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Module III **[9H]**

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent. Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

Module IV **[9H]**

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Module V **[9H]**

Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election Algorithm, CORBA Case Study: CORBA RMI, CORBA services.

Text Books

1. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.
2. Gerald Tel, "Distributed Algorithms", Cambridge University Press.

Reference Books

1. Andrew S. Tanenbaum and Maarten van Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2002, ISBN: 0-13-088893-1
2. Beck et al Linux Kernel, Internal Addition Wesley, 1997

Course Name: Principles of Virtual Reality
Course Code: DCSTD401B
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction: The three I's of virtual reality, commercial VR technology and the five classic components of a VR system.

Module II **[9H]**

Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces.
Output Devices: Graphics displays, sound displays & haptic feedback.

Module III **[9H]**

Modeling: Geometric modeling, kinematics modeling, physical modeling, behaviour modeling, model management, Geometric modeling, kinematics modeling, physical modeling, behaviour modeling, model management.

Module IV **[9H]**

VR Programming-I : Introducing Java 3D, loading and manipulating external models, using a

lathe to make shapes, 3D Sprites, animated 3D sprites, particle systems, Virtual Reality Markup Language (VRML).

Module V **[9H]**

Applications: Medical applications, military applications, robotics applications.

Text Books

1. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc.
2. Killer Game Programming in Java, Andrew Davison, Oreilly-SPD, 2005.

Reference Books

1. Understanding Virtual Reality, interface, Application and Design, William R.Sherman, Alan Craig, Elsevier (Morgan Kaufmann).
2. 3D Modeling and surfacing, Bill Fleming, Elsevier (Morgan Kauffman)..

Course Name: Web Technologies
Course Code: DCSTS401
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction and Web Development Strategies

- History of Web
- Internet Principles– basic web concepts
- Protocols governing Web
- Understanding websites and web servers
- Browsers, URLs
- Writing Web Projects
- Web development strategies
- Web service providers
- Client/ server model
- Retrieving data from Internet,
- Web Applications.

Module II **[9H]**

HTML, XML and Scripting

- List, Tables

- Images, Forms, Frames
- CSS Document type definition
- XML schemes, Object Models
- Presenting XML, Using XML Processors: DOM and SAX
- Introduction to Java Script
- Object in Java Script
- Dynamic HTML with Java Script
- Introduction to AJAX
- VB Script
- CGI

Module III **[9H]**

Java Beans and Web Servers

- Introduction to Java Beans, Advantage, Properties
- Introduction to EJB
- Java Beans API
- Introduction to Servelets
- Lifecycle
- Servlet API, Servlet Packages
- HTTP package with Http request and response
- Security Issues.

Module IV **[9H]**

JSP

- Introduction to JSP
- JSP processing, JSP Application Design,
- Implicit JSP objects, Conditional Processing
- Declaring variables and methods,
- Error Handling and Debugging,
- Sharing data between JSP pages- Sharing Session and Application Data.
- Introduction to active server pages (ASP) and ASP.Net

Module V **[9H]**

Database Connectivity

- PHP: An introduction to PHP
- PHP- Using PHP- Variables- Program control- Built-in functions
- Connecting PHP to SQL database
- Introduction to Struts framework
- Joomla.

Text Books

1. Burdman, Collaborative Web Development, Addison Wesley.
2. Chris Bates, Web Programing Building Internet Applications, 2nd Edition, WILEY, Dreamtech

References Books

1. Joel Sklar , Principal of web Design, Vikash and Thomas Learning
2. Horstmann, "CoreJava", Addison Wesley.

Course Name: Essence of Indian Knowledge and Tradition
Course Code:
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[5H]**

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge Vs western knowledge

Module 2 **[6H]**

Introduction To Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.

Module III **[5H]**

Religion and Philosophy: Major religions practiced in India and Understanding their Philosophy – religious movements in Modern India (Selected movements only), Indian Religion, Philosophy, and Practices Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines

Module IV **[5H]**

Education System in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

Module V **[6H]**

Indian Literature, Culture, Tradition, and Practices Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas,
(i) Ved (ii) Upved (Ayurveda, Dhanurveda,Gandharveda, Architechture etc) (iii) Vedanga (Siksha,Kalpa, Nirut, Byakaran, Jyotish, Chhand), (iv) Upanga (Dharm Shastra,Mimangsha, Puran, Tarka shastra),
the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature ,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature

Module VI **[6H]**

Science, Management and Indian Knowledge System Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India ,Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile

Technology in India , Writing Technology in India Pyrotechnics in India Trade in Ancient India/,India's Dominance up to Pre-colonial Times

Module VII **[6H]**

Cultural Heritage and Performing Arts Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Seals, coins, Pottery, Puppetry, Dance, Music, Theatre, drama, Painting, Martial Arts Traditions, Fairs and Festivals, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World.

Module VIII **[6H]**

Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

Text Books

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.

Reference Books

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan

Semester V

Course Name: E-Commerce
Course Code: DCSTC501
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction: An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management

Module II **[9H]**

Understanding ERP: ERP -A Manufacturing Perspective, ERP Module, ERP Market, ERP implementation life cycle, Implementation Methodology, Not all Packages are Created Equal!, Options of various paradigms, Identification of suitable platforms, Role of SDLC/SSAD, Object oriented architecture. Case Discussion: Raising Seed Financing

Module III **[9H]**

ERP Implementation: ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project

Management and Monitoring, After ERP Implementation issues.

Module IV **[9H]**

Business Modules in ERP: Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution. ERP-Present and Future: Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E-Commerce, ERP and Internet, Future Directions in ERP

Module V **[9H]**

E-commerce: What is E-commerce? Comparison between Traditional and Electronic commerce, Issues associated with electronic commerce. Inter Organisational E- commerce, Intra Organisational E-Commerce, Architectural frame work. Introduction of Mobile Commerce. Introduction to Mobile Commerce. Mobile Computing Applications.

Text Books

1. S. Sadagopan, "Enterprise Resource Planning", Tata McGraw Hill 2000
2. Bajaj, Kamlesh K. and Nag, Debjani, E-Commerce: The Cutting Edge of Business, Tata McGraw-Hill Publishing Company

Reference Books

1. Alexis Leon, "Enterprise Resource Planning", Tata McGraw Hill 2001
2. Loshin, Pete and Murphy, Paul, Electronic Commerce, Second edition, 1990, Jaico Publishing House, Mumbai.

Course Name: Internet of Things
Course Code: DCSTC502
Contact: 3L
Credits: 2
Contact Hrs: 30

Module I **[6H]**

Introduction to IoT; Sensing; Actuation

Module II **[6H]**

Basics of IoT Networking, Communication Protocols, Sensor networks

Module III **[6H]**

Introduction to Arduino programming, Integration of Sensors/Actuators to Arduino

Module IV **[6H]**

Implementation of IoT with Raspberry Pi; Data Handling Analytics

Module V **[6H]**
Case Studies: Agriculture, Healthcare, Activity Monitoring

Text Books

1. The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. Internet of Things by Dr. Jeeva Jose, Khanna Publishing House (Edition 2017)

Reference Books

1. Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press),
2. Internet of Things : Design and Principles, Raj Kamal, McGraw Hill

Course Name: Fundamentals of AI
Course Code: DCSTD501A
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction: Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem.

Intelligent Agents: Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.

Problem Solving: Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs.

Module II **[8H]**

Search techniques: Solving problems by searching :problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies.

Heuristic search strategies: Greedy best-first search, A * search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated

annealing search, local beam search, genetic algorithms; constraint satisfaction problems, local search for constraint satisfaction problems.

Module III **[7H]**

Adversarial search: Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening.

Module IV **[7H]**

Knowledge & reasoning: Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation.

Module V **[7H]**

Using predicate logic: Representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction.

Probabilistic reasoning: Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics.

Module VI **[7H]**

Natural Language processing: Introduction, Syntactic processing, semantic analysis, discourse & pragmatic processing.

Learning: Forms of learning, inductive learning, learning decision trees, explanation based learning, learning using relevance information, neural net learning & genetic learning.

Expert Systems: Representing and using domain knowledge, expert system shells, knowledge acquisition.

Text Books

1. Artificial Intelligence, Ritch & Knight, TMH
2. Artificial Intelligence A Modern Approach, Stuart Russel Peter Norvig Pearson

Reference Books

1. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
2. Poole, Computational Intelligence, OUP

Course Name: Advanced Computer Networks
Course Code: DCSTD501B
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

- Uses computer networks Reference Models
- TCP/IP suite of protocols

- Protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)
- Fast access technologies. (For example, ADSL, Cable Modem, etc.)

Module II **[9H]**

- Network Layer Design Issues
- Routing Algorithms,
- Congestion Control Algorithms,
- Quality of Service,
- Internet Working,
- Network Layer in Internet.
- IPv6 basic protocol-extensions and options,
- support for QoS,
- security
- Changes to other protocols,
- Application Programming Interface for IPv6

Module III **[9H]**

- Mobile IP
- IP Multicasting.
- Multicast routing protocols
- address assignments
- session discovery

Module IV **[9H]**

- The Transport Protocol: The Transport Service,
- Elements of transport protocol,
- A simple Transport Protocol,
- Internet Transport Protocols UDP
- Internet Transport Protocols TCP,
- TCP extensions for high-speed networks
- transaction-oriented applications Performance Issues.
- The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia

Module V **[9H]**

- Overview of network security
- Secure-HTTP
- SSL,
- ESP,
- Key distribution protocols.
- Digital signatures,
- Digital certificates-mail Security,
- Web security,
- Social Issues
- Various installations and connections of LAN, WAN etc

Text Books

1. Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan. Fourth Edition TMH.

References Books

1. Computer Communications and Networking Technologies –Michael A.Gallo, WilliamM .Hancock - Thomson Publication.
2. W. Stallings. Cryptography and Network Security: Principles and Practice Prentice Hall.

Course Name: Information Security
Course Code: DCSTD502A
Contact: 3L
Credits: 2
Contact Hrs: 30

Module I **[6H]**

Introduction to Information Security, Various aspects of information security (PAIN), Security Features of Operating Systems – Authentication, Logs, Audit Features, File System Protection, User Privileges, RAID options, Anti-Virus Software, etc.

Module II **[6H]**

Understanding security weaknesses in popular networking protocols – IP, TCP, UDP, RIP, OSPF, HTTP, SMTP, etc.; security weaknesses in common networking devices – Hub, switch, router, WiFi; Security solutions to mitigate security risk of networking protocols (IPSec, HTTPS, etc) and devices (VLAN, VPN, Ingress Filtering, etc)

Module III **[6H]**

Basics of Cryptography, PKI, Security considerations while developing softwares

Module IV **[6H]**

Network Security Products – Firewall, IDS/IPS, VPN Concentrator, Content Screening Gateways, etc.

Module V **[6H]**

Introduction to Security Standards – ISO 27001, Indian IT Act, IPR Laws; Security Audit procedures; Developing Security Policies; Disaster Recovery, Business Continuity Planning

Text Books

1. Information Security and Cyber Laws, Sarika Gupta, Khanna Publishing House
2. RFCs of protocols listed in content (https://www.ietf.org)

Reference Books

1. Various Acts, Laws and Standards (IT Act, ISO27001 Standard, IPR and Copyright Laws, etc.)
2. Security Guideline documents of Operating Systems (OS Manual, Man Pages, etc)

Course Name: Network Forensics
Course Code: DCSTD502B
Contact: 3L
Credits: 2
Contact Hrs: 30

Module I **[6H]**

Review of Networking concepts and Protocols, Introduction to Network Forensics, various aspects of Network Forensics

Module II **[6H]**

Introduction to Network Forensic Tools and techniques: Wireless. TCP Dump NMS, -Mode, Network Port Mirroring. snooping. scanning tools, etc.

Module III **[6H]**

Understanding and Examining Data Link Layer, Physical Layer. Ethernet Switch Logs. MAC Table, ARP Table,etc.

Understanding and Examining Network Layer; Router Logs. WiFi Device logs. Firewall logs.

Module IV **[6H]**

Understanding audit features of OS and applications; Enabling and Examining Server logs. User activity logs, Browser history analysis. Proxy server logs, Antivirus logs. Email logs

Module V **[6H]**

Limitations and challenges of network forens ics due to encryption. spoofing.mobility.storage limitations, privacy laws, etc.

Text Books

1. Handbook of Digital Forensics and Investigation, Eoghan Casey, Elsevier Academic Press
2. Cyber Forensics,Albert Marcella and Doug Menendez, CRC Press

Reference Books

1. Manuals of OS, application software,network devices
2. RFCs of various networking protocols (https://www.ietf.org/)

Course Name: FOSS (Free and Open Source Software)
Course Code: DCSTE501A

Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[12H]**

FOSS Philosophy: Understanding the FOSS Community and FOSS Philosophy, Benefits of Community based Software Development, Guidelines for working with FOSS community, Requirements for being open, free software, open source software, FOSS Licensing Models, FOSS examples

Module II **[11H]**

LINUX: Linux Installation and Hardware Configuration, Boot Process, Dual -Booting Linux and other Operat ing Systems, Kernel Options during Boot, X Windows System Configuration, System Administration (Server Administration, Backup and Restore Procedures,Strategies for keeping a Secure Server)

Module III **[11H]**

Programming Tools and Techniques: Libreoffice Tools; Samba: Cross platform; Introduction about LAMP; Brief Introduction to Programming using languages like Java / Python / Perl; Database Systems Postgre SQL or equivalent; Open Source UML Tools;
Introduction to Mobile Programming; Version Control Systems like SVN, Qi1or equivalent; Project Management Tools; Bug Tracking Systems; Package Management Systems

Module IV **[11H]**

FOSS case studies: Some example case studies of FOSS implementation

Text Books

1. Linux in a Nutshell, by Ellen Siever
2. Philosophy of GNU URL: http://www.gnu.org/philosophy/.

Reference Books

1. Linux Administration URL: http://www. tldp.org/LDP/lame/LAM E/linux-adm in-made- w:i).
2. Version control system URL: http ://git-scm.com/.

Course Name: Data Sciences: Data Warehousing and Data Mining
Course Code: DCSTE501B
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

- The Data Warehouse –Introduction, characteristics, its competitive advantages
- Operational Database Systems and Data Warehouse (OLTP & OLAP)

- Multidimensional Data Models: Types of Data from Tables and Spreadsheets to Data Cubes

Module II **[9H]**

- Identifying Facts and Dimensions
- Designing Fact Tables
- Designing Dimension Table
- Data Warehouse Schemas
- OLAP Operations
- Data Extraction
- Cleanup & Transformation
- Star, snowflake and galaxy schemas for multidimensional databases.
- Architecture for a warehouse
- Steps for construction of Data Warehouses
- Data Marts
- Metadata
- Different OLAP operations
- OLAP Server: ROLAP, MOLAP and HOLAP.

Module III **[9H]**

- From Data warehousing to data mining
- Motivation
- Knowledge Discovery Process
- Objectives of Data Mining
- The business context for DM
- Process improvement
- marketing and CRM
- Tools of Data Mining

Module IV **[9H]**

- Data preparation
- Data Mining Techniques
- Statistical techniques
- Characterization and discrimination
- Association and market basket analysis
- Classification and Prediction
- Cluster analysis
- Outlier analysis.

Module V **[9H]**

- Text Mining
- Spatial Databases
- Web Mining
- Case studies in building business environment.
- Applications in telecommunications industry, retail, target marketing, fraud protection, health care, science, ecommerce, banking and finance.

Text Books

1. Jiawei Han & Micheline Kamber, Data Mining: Concepts & Techniques, Morgan Kaufmann Publishers, 2002
2. Paul Raj Poonia, Fundamentals of Data Warehousing, John Wiley & Sons, 2004.

References Books

1. Data Ware housing: Concepts, Techniques, Products and Applications, C.S.R. Prabhu, Prentice Hall of India, 2001.
2. Sam Anahory, Dennis Murray. Data Warehousing in the Real World, Pearson, 2005.

Semester VI

Course Name: Software Testing
Course Code: DCSTD601A
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Objective and Need for testing, Psychology of testing , Impracticality of Testing All data; Impracticality of Testing All Paths; No Absolute Proof of Correctness, Defect, Difference between defect and bug, Life cycle of defect, Testing economics - White box, Black box, Grey box testing , SDLC and Testing - Verification & Validation, Software Technical Reviews

Module II **[9H]**

White box testing techniques, Statement coverage, Branch Coverage, Condition coverage, Decision/Condition coverage, Multiple condition coverage, Dataflow coverage, Mutation testing, Automated code coverage analysis, Black box testing techniques, Boundary value analysis, Robustness testing, Equivalence partitioning, Syntax testing, Finite state testing

Module III **[9H]**

Software Testing: Levels of Testing, Regression Testing, Requirements Tracing, Requirement Traceability Matrix, V & V Standards, Identification of V & V Goals and Techniques: Requirements, Specifications, Designs, Implementations, Changes, Organizational Responsibilities, Test Automation: Why and How?

Module IV **[9H]**

Software Quality Assurance, test optimization, Eleven Step Testing Process (Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes, Evaluate Test Effectiveness), Testing Security.

Module V **[9H]**

Software Reusability, Software Metrics, Software Testing Tools, Defect Tracking Tools, Defect Management Tools, Challenges, Error-Oriented Testing and Analysis, Simulation and

Prototyping, Differences from testing non-OO Software, Class testing strategies, Class Modality, Message Sequence Specification

Text Books

1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.
2. Louise Tamres, "Software Testing", Pearson Education Asia, 2002

References Books

1. CemKaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.
2. K.K. Aggarwal&Yogesh Singh, "Software Engineering", 2nd Ed., New Age International Publishers, New Delhi, 2005

Course Name: Information Storage Management
Course Code: DCSTD601B
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction to Storage Technology: Data proliferation and the varying value of data with time & usage, Sources of data and states of data creation, Data center requirements and evolution to accommodate storage needs. Overview of basic storage management skills and activities, The five pillars of technology, Overview of storage infrastructure components, Evolution of storage, Information Lifecycle Management concept, Data categorization within an enterprise, Storage and Regulations.

Module II **[9H]**

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure-components, properties, performance, and specifications, Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties and algorithms, Front end connectivity and queuing properties, Front end to host storage provisioning, mapping, and operation, Interaction of file systems with storage, Storage system connectivity protocols.

Module III **[9H]**

Introduction to Networked Storage: JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks (SAN): elements & connectivity, Fibre Channel principles, standards, & network management principles, SAN management principles, Network Attached Storage (NAS): elements, connectivity options, connectivity protocols (NFS, CIFS, ftp), & management principles, IP SAN elements, standards (iSCSI, FCIP, iFCP), connectivity principles, security, and management principles, Content Addressable Storage (CAS): elements, connectivity options, standards, and management principles, Hybrid Storage solutions overview including technologies like virtualization & appliances.

Module IV **[9H]**

Introduction to Information Availability, Managing & Monitoring: Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques, Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management metrics (thresholds, availability, capacity, security, performance), Metric analysis methodologies & trend analysis, Reactive and pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

Module V **[9H]**

Security & Virtualization: Storage Security (Importance of Information security, elements and attributes of security), Developing a storage security model (Restricting Access Path, Vulnerability Management, Understanding Vulnerabilities), Securing Data Storage (Storage Security domains, Risk assessment Methodology, Security elements, threats against applications, Controlling user access to data, threats again backup , recovery and archive) Virtualization (Define virtualization, types of virtualization), Storage Virtualization (Storage functionality, Virtual storage, Comparison of virtualization architectures, challenges of storage virtualization), Block level virtualization, File level virtualization.

Text Books

1. Information Storage and Management, Wiley Publication ISBN: 978-81-265-2147-0
2. Marc Farley Osborne, "Building Storage Networks", Tata McGraw Hill

References Books

1. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill
2. Information Storage and Management: Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments

Course Name: Advanced Java
Course Code: DCSTD602A
Contact: 3L
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction the Advanced Web Technology (AWT)

1. Working with Windows and AWT AWT classes Windows Fundamentals Working with frame windows Creating a frame window in applet Creating windowed program Display information within with in a window
2. Working with graphics Working with color Setting the paint mode, Working with Fonts Managing text output using Font Metrics Exploring text & graphics
3. Using AWT Controls, Layout Managers and Menus Control Fundamentals Labels Using Buttons Applying Check Boxes Checkbox Group Choice Controls Using Lists Managing scroll Bars Using a Text Field Using a Text Area Understanding Layout Managers Menu

Bars and Menu Dialog Boxes File Dialog Handling events by Extending AWT Components Exploring the Controls, Menus, and Layout Managers

Module II **[9H]**

Networking

1. Basics Socket overview, client/server, reserved sockets, proxy servers, internet addressing.
2. Java & the Net The networking classes & interfaces
3. Inet address Factory methods, instance method
4. TCP/IP Client Sockets What is URL Format
5. URL connection
6. TCI/IP Server Sockets
7. Data grams Data gram packets, Data gram server & client

Module III **[9H]**

The Tour of Swing
J applet, Icons and Labels ,Text Fields, Buttons Combo Boxes Tabbed Panes, Scroll Panes.
Trees, Tables, Exploring the Swings.

Module IV **[9H]**

Servlets

1. Background, The Life Cycle Of a Servlet, The Java Servlet Development Kit, The Simple Servlet, The Servlet API
2. The Javax Servlet Package, Reading Servlet Parameters Reading Initialization Parameters The Javax. Servlet. http package, Handling HTTP Requests and responses
3. Using Cookies, Session Tracking, Security Issues, Exploring Servlet. System model, principle necessary

Module V **[9H]**

JavaBeans Component

1. Bean Writing Process, Using Beans to build an Application, Beans Property. Security-Class Loader, Byte code Verification
2. Security Managers and Permissions, User Authentication, Digital Signatures, Code Signing, Encryption.

Text Books

1. Debasish Jana, Java and Object Oriented Programming Paradigm, PHI
2. Hall Core Servlets and JavaServer Pages: Volume I: Core Technologies, 2e

Reference Books

1. Horstmann, Cornell Core Java Vol II, PEARSON
2. Savaliya, Advance Java Technology, Dreamtech

Course Name: Mobile Application Development
Course Code: DCSTD602B
Contact: 3P

Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction to Mobile Computing, Introduction to Android Development Environment, Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User, VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodial UIs.

Module II **[9H]**

Android Intents and Services , Characteristics of Mobile Applications ,Successful Mobile Development, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider.

Module III **[9H]**

State Machine, Correct Communications Model, Android Networking and Web, Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony, Performance and Memory Management, Android Notifications and Alarms.

Module IV **[9H]**
Performance and Multithreading, Graphics and UI Performance, Android Graphics, Mobile Agents and Peer-to-Peer Architecture, Android Multimedia, Mobility and Location Based Services.

Module V **[9H]**
Packaging and Deploying, Performance Best Practices, Android Field Service App, Active Transactions, More on Security, Hacking Android.

Text Books

1. Professional Android 4 Application Development, Reto Meier, 3rd Edition, 2012, Wrox professional press, ISBN-13: 978-1118102275.
2. Android Wireless Application Development Volume I: Android Essentials (3rd Edition), Lauren Darcey and Shane Conder, ISBN-13: 978-0321813831

Reference Books

1. Android Wireless Application Development Volume II: Advanced Topics (3rd Edition), Lauren Darcey and Shane Conder, ISBN-13: 978-0321813848
2. Android for Programmers: An App-Driven Approach, Paul Deitel, Harvey Deitel, Abbey Deitel, and Michael Morgano, ISBN-13: 978-0132121361

Course Name: Cyber Security
Course Code: DCSTE601A
Contact: 3P
Credits: 3
Contact Hrs: 45

Module I **[9H]**

- Introduction to Information, Computer and Network Security,
- Security Concepts, kinds of security breaches,
- Threats and Risks, Point of vulnerability,
- Attacks- Passive and Active, Security Services, Confidentiality, Authentication, Non-Repudiation, Integrity, Access Control, Availability,
- Model for Internetwork Security, Internet Standards and RFCs

Module II **[9H]**

- Sources of security threats, Motives, Target Assets,
- Consequence of threats, E-mail threats, Web threats, Hacking, Intruders, Insider threats
- Cyber Squatting, Cyber Stalking, Crime of deception, Content Oriented Online Crime, Malicious Software use and detection,
- Cyber Terrorism, Information warfare and surveillance, Virtual Crime, Online Frauds
- Identity Theft and Intellectual property theft, Network threats-Worms, Virus, Spam's, Ad-ware, Spy ware,
- Trojans and convert Channels, Backdoors, Bots, IP spoofing, ARP spoofing,
- Session hijacking, Sabotage, phishing, Zombie/Zombie Drone.

Module III **[9H]**

- Security Engineering: Security Threat Management, Risk Assessment,
- Introduction to Cyber Forensics, Evaluation of crime scene & evidence collection,
- Security Policies, Risk Management, Procedure and Guidelines.
- Cyber Laws: Advantages, cyber lawyers, Jurisdiction and Sovereignty.
- The IT Act of India 2000
- Intellectual property rights, Ownership & Enforcement of IPR
- Defenses for Infringement
- Copy right objective , Transfer of copy right, practical aspect of licensing
- Benefits, jurisdictional Issues, copy right in digital media, patents in cyber world

Module IV **[9H]**

- Introduction to Cryptography
- E-Commerce Security
- Message Authentication, Hash functions, Hashes and Message Digests
- Number Theory for Information Security
- Public Key Algorithms , Public-key Infrastructure, PKI Applications
- Cryptographic Protocols, Digital Signature
- Digital Watermarking and Steganography
- Biometric Security
- Encryption, Symmetric Key Encryption, Data Encryption Standard (DES), Kerberos

Module V **[9H]**

- Introduction to Security Risk Management, risk assessment,
- Security Assurance Approaches: OCTAVE and COBIT approaches.
- Security Management of IT Systems: Network security management, Firewalls, IDS and IPS configuration management.
- Web and wireless security management.

- Security Models, Access control models, role-based and lattice models.
- Computer security log management, malware handling and vulnerability management programs.
- Specifying and enforcing security policies,
- Information security audit and principles of audit.
- Information Security Standards and Compliance: Overview of security standards ISO 17799 Standard, Legal and Ethical issues, PCI DSS

Text Books

1. Cryptography and Information Security: V.K. Pachghare, PHI
2. Cyber Laws and IT Protection: Harish Chander, PHI

Reference Books

1. William Stallings, Network Security Essentials (Applications and Standards) Pearson Education.
2. Ortmeier, P. J. Security Management: An Introduction, 2nd edition, Prentice Hall., 2005

Course Name: Cloud Computing
Course Code: DCSTE601B
Contact: 3P
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Journey to the Cloud

- Key business drivers
- Definition
- essential characteristics
- Phases of journey to the Cloud.
- Key topics covered in this section are: Business drivers for Cloud computing
- Definition of Cloud computing
- Characteristics of Cloud computing as per NIST
- Steps involved in transitioning from Classic data center to Cloud computing environment

Module II **[9H]**

Classic Data Center (CDC)

- Key elements of CDC - compute, storage, and network, with focus on storage

networking, business continuity, and data center management.

- Application, DBMS, Compute, Storage and Networking
- Object based and Unified storage technologies
- Business continuity overview and backup
- Replication technologies, CDC Management

Module III **[9H]**

Virtualized Data Center (VDC)

- Virtualized Data Center (VDC)
- storage, networking, desktop and application virtualization
- Compute, Storage, Network virtualization techniques
- Virtual machine (VM) components and process of converting physical to VMs
- Block and file level storage virtualization
- Virtual provisioning and automated storage tiering,
- Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits,
- Key network traffic management techniques in VDC
- Methods for implementing desktop virtualization, their benefits, and considerations
- Application virtualization methods, benefits, and considerations
- Backup and recovery of Virtual Machines (VMs)
- VM replication and migration technologies
- Recovery options from total site failure due to a disaster

Module IV **[9H]**

Cloud Computing and Infrastructure

- Cloud Computing
- Different Cloud services and deployment models
- Economics of Cloud, Cloud infrastructure components
- Cloud service creation processes
- Cloud service management processes that ensure that the delivery of Cloud services is aligned with business objectives and expectations of Cloud service consumers
- cloud services models
- Cloud deployment models
- Economics of Cloud
- Cloud infrastructure components
- Cloud service creation processes
- Cloud service management processes

Module V **[9H]**

Cloud Security and Migration to cloud

- Security concerns and migration considerations to cloud
- Cloud models suitable for different categories of users
- Security concerns and counter measures in a VDC and Cloud environment
- Governance
- Risk and Compliance aspects in Cloud
- Cloud security best practices
- Cloud models suitable for different categories of users
- Considerations for choosing applications suitable for Cloud
- Different phases to adopt the Cloud

Text Books

1. Cloud Computing: Insights Into New-Era Infrastructure by Kumar Saurabh- Wiley India Pvt Ltd (2011) ISBN: 8126528834
2. Cloud Computing: A Practical Approach by Anthony T. Velte - Tata IVIcgraw Hill Education Private Limited (2009) ISBN: 0070683514

References Books

1. Cloud Computing For Dummies by Halper Fern, Kaufman IVIarcia, Bloor Robin, Hurwit Judith, - Wiley India Pvt Ltd (2009) ISBN: 8126524871
2. Cloud Computing: Principles and Paradigms, Rajkumar Buyya

Course Name: Indian Constitution
Course Code: DCSTS601
Contact: 3P
Credits: 3
Contact Hrs: 45

Module I **[9H]**

Introduction: Constitution' meaning of the term, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

Module II **[9H]**

Union Government and its Administration : Structure of the Indian Union: Federalism, Centre-State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha

Module III **[9H]**

State Government and its Administration Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Module IV **[9H]**

Local Administration District's Administration head: Role and Importance,

Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation,

Pachayati raj: Introduction, PS, Zila Pachayat, Elected officials and their roles,

CEO Zila Pachayat: Position and role,

Block level: Organizational Hierarchy (Different 4.departments),

Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Module V **[9H]**

Election Commission Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners,

State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

Premble, fundamental rights, fundamental duties, directive principle of state policy

Text Books

1. Lexis Nexis's Introduction to the Constitution of India by Durga Das Basu
2. V.N. Shukla's Constitution of India by Prof (Dr.) Mahendra Pal Singh

Reference Books

1. The Indian Constitution (Oxford India Short Introductions Series) by Madhav Khosla
2. Constitution of India : The Constitution of India is the supreme law of India by P. K. Agarwal