

# **Appendix - IV**

**COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**B.TECH DEGREE COURSE IN**

**INFORMATION TECHNOLOGY**

**(2015 ADMISSIONS)**

**SCHEME OF EXAMINATIONS & SYLLABUS**

**I to VIII Semesters**

**SEMESTER I [Stream B]**

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/ Wk	Cred	Marks		Total
						CA	ESE	
GE 1101B	Computer Programming	3	1	0	3	40	60	100
AS 1102B	Engineering Chemistry	3	1	0	3	40	60	100
GE 1103B	Engineering Graphics	2	1	3	5	40	60	100
GE 1104B	Basic Electrical Engineering	3	0	0	3	40	60	100
GE 1105B	Basic Electronics Engineering	3	0	0	3	40	60	100
AS 1106B	Environmental Studies	3	1	0	3	40	60	100
GE 11L1B	Electrical Engineering Workshop	0	0	3	1	25	25	50
GE 11L2B	Computer Programming Laboratory	0	0	3	1	25	25	50
<b>TOTAL</b>		<b>17</b>	<b>4</b>	<b>9</b>	<b>22</b>			

CA – Continuous Assessment, ESE – End Semester Examination

**SEMESTER II [Stream B]**

Code No.	Subject	L Hrs/W k	T Hrs/Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	ESE	
AS 1201B	Calculus	3	1	0	3	40	60	100
AS 1202B	Engineering Physics	3	1	0	3	40	60	100
GE 1203B	Engineering Mechanics	4	1	0	4	40	60	100
GE 1204B	Basic Civil Engineering	3	0	0	3	40	60	100
GE 1205B	Basic Mechanical Engineering	3	0	0	3	40	60	100
HS 1206B	Technical Communication and Professional Ethics	2	1	0	2	40	60	100
GE 12L1B	Civil Engineering Workshop	0	0	3	1	25	25	50
GE 12L2B	Mechanical Engineering Workshop	0	0	3	1	25	25	50
HS 12L3B	Language Lab	0	0	1	1	25	25	50
GE 12L4B	NSS / Nature conservation	0	0	1	1	50	-	50
<b>TOTAL</b>		<b>18</b>	<b>4</b>	<b>8</b>	<b>22</b>			

CA – Continuous Assessment, ESE – End Semester Examination

**SEMESTER III**

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	ESE	
AS 15-1301 *	Linear Algebra and Transform Techniques	3	1	0	3	40	60	100
IT 15-1302	Logic Design and Electronic Circuits	3	1	0	3	40	60	100
CS/IT 15-1303	Discrete Computational Structures	3	1	0	3	40	60	100
CS/IT 15-1304	Object Oriented Programming	3	1	0	3	40	60	100
IT 15-1305	Computer Organization	3	1	0	3	40	60	100
IT 15-1306	Data Communication & Networking	3	1	0	3	40	60	100
IT 15-13L1	Logic Design and Electronic Circuits Laboratory	0	0	3	2	25	25	50
CS/IT 15-13L2	Object Oriented Programming Laboratory	0	0	3	2	25	25	50
<b>TOTAL</b>		<b>18</b>	<b>6</b>	<b>6</b>	<b>22</b>			

\* Common for all branches

**SEMESTER IV**

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	ESE	
AS 15-1401 *	Complex Variables and Partial Differential Equations	3	1	0	3	40	60	100
IT 15-1402	Formal Languages, Automata and Computation	3	1	0	3	40	60	100
IT 15-1403	System Programming	3	1	0	3	40	60	100
IT 15-1404	Microprocessor and Microcontroller Architecture	3	1	0	3	40	60	100
CS/IT 15-1405	Data structures and Algorithms	3	1	0	3	40	60	100
IT 15-1406	Database Management Systems	3	1	0	3	40	60	100
IT 15-14L1	PC Hardware & Microprocessor Lab	0	0	3	2	25	25	50
CS/IT 15-14L2	Data structures Laboratory	0	0	3	2	25	25	50
	<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>22</b>			

\* Common for all branches

**SEMESTER V**

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	ESE	
AS 15-1501 *	Numerical and Statistical Methods	3	1	0	3	40	60	100
CS/IT15-1502	Operating Systems	3	1	0	3	40	60	100
IT 15-1503	Knowledge Engineering	3	1	0	3	40	60	100
IT 15-1504	Design and Analysis of Algorithms	3	1	0	3	40	60	100
IT 15-1505	Software Engineering	3	1	0	3	40	60	100
IT 15-1506	Internet Programming	3	1	0	3	40	60	100
IT 15-15L1	Operating System & Network Programming Lab	0	0	3	2	25	25	50
IT 15-15L2	Mini Project – RDBMS based	0	0	3	2	50	-	50
	<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>22</b>			

\* Common for all branches

**SEMESTER VI**

Code No.	Subject	L Hrs/ Wk	T Hrs/Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	ESE	
IT 15-1601	Financial Management & E-banking	3	1	0	3	40	60	100
CS/IT15-1602	Compiler Construction	3	1	0	3	40	60	100
IT 15-1603	Object Oriented Modeling & Design	3	1	0	3	40	60	100
IT 15-1604	Cloud Computing	3	1	0	3	40	60	100
IT 15-1605	Big Data Analytics	3	1	0	3	40	60	100
IT 15-1606	Elective I	3	1	0	3	40	60	100
IT 15-16 L1	Cloud and Distributed Computing Laboratory	0	0	3	2	25	25	50
IT 15-16 L2	Mini Project – Android based Internet Project	0	0	3	2	50	-	50
	<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>22</b>			

IT15-1606 E1. Multimedia Computing  
 IT15-1606 E2. Wireless networking  
 IT15-1606 E3. Soft Computing  
 IT15-1606 E4. Software Quality & Testing  
 IT15-1606 E5. Advanced Computer Architecture

**SEMESTER VII**

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	ESE	
GE 15-1701	Principles of Management	3	1	0	3	40	60	100
IT 15-1702	Operations Research	3	1	0	3	40	60	100
IT 15-1703	Computer Graphics	3	1	0	3	40	60	100
IT 15-1704	Internet of Things	3	1	0	3	40	60	100
IT 15-1705	Elective II	3	1	0	3	40	60	100
IT 15-17 L1	Computer Graphics Laboratory	0	0	3	2	25	25	50
IT 15-17 L2	Mini Project – Multimedia Project	0	0	3	2	50	-	50
GE 15-17 L3	Entrepreneurship Development	0	0	2	2	50	-	50
IT 15-17 L4	Project Phase I & Industrial Internship**	0	0	2	1	50	-	50
	<b>TOTAL</b>	<b>15</b>	<b>5</b>	<b>10</b>	<b>22</b>			

\*\*Industrial Internship for a minimum duration of two weeks during May- June vacation before the commencement of 7<sup>th</sup> Semester classes is desirable

IT15-1705 E1. Game Design  
 IT15-1705 E2. Mobile computing  
 IT15-1705 E3. Agile Project Management  
 IT15-1705 E4. Data Mining  
 IT15-1705 E5. Human Computer Interaction

**SEMESTER VIII**

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	ESE	
IT 15-1801	Electronic Business and Services	3	1	0	3	40	60	100
IT 15-1802	Real Time Systems	3	1	0	3	40	60	100
IT 15-1803	Security & Cyber Laws	3	1	0	3	40	60	100
IT 15-1804	Elective III	3	1	0	3	40	60	100
IT 15-18 L1	Seminar	3	1	3	2	50	-	50
IT 15-18 L2	Project Phase II	0	0	12	6	200	-	200
IT 15-18 L3	Comprehensive Viva voce	0	0	0	2	-	50	50
	<b>TOTAL</b>	<b>12</b>	<b>4</b>	<b>15</b>	<b>22</b>			

IT15-1804 E1. Social Computing  
 IT15-1804 E2. Service Oriented Architecture  
 IT15-1804 E3. Recommender System  
 IT15-1804 E4. Randomized Algorithms  
 IT15-1804 E5. Bio Computing

### LIST OF OPTIONAL SUBJECTS

Sl. No:	Subject	L	T	P	No: of Hours/Semester	CA Marks
1	Personality Enrichment	1	2		30	50
2	General Aptitude	1	2		30	50
3	Foreign Language	1	2		30	50
4	Advanced Computer Programming	1		2	30	50
5	Healthy Living	1		2	30	50
6	Theatre Arts	1		2	30	50
7	Imaging Devices	1		2	30	50
8	Disaster Management	1		2	30	50

One or more optional subjects may be offered in any semester outside regular teaching hours and the students may opt to study them if they wish. The course may be conducted by using experts from inside or outside the University on Self Supporting manner. The Fee may be fixed based on the expenses in a non-profit manner with the students of the department given a subsidised rate of fee and those from outside may also be allowed at a higher fee. The regular students may be issued the mark list with the optional subject included in current semester and the outsiders may be issued a certificate separately.

## 1101A / 1201B ENGINEERING MATHEMATICS I

**Objectives:** To acquire fundamental knowledge and apply in engineering disciplines.

**Expected Outcome:** After the completion of the course, students would be able to solve curriculum problems.

### Module I

#### Ordinary differential equations:

First order differential equations - exact differential equations, Bernoulli's equations-- Methods of solution and Simple applications.

Linear differential equations of higher orders with constant co-efficients-Methods of solution of these equations. Cauchy's linear differential equations. Simultaneous linear differential equations- Simple applications of linear differential equations in engineering problems – Electrical Circuits, Mechanical Systems.

### Module II

**Infinite series :** Integral test, comparison test, ratio test, Cauchy's root test, Raabe's test, series of positive and negative terms, concept of absolute convergence, alternating series, Leibniz test(No proofs for any of the above tests)

**Power series :** Taylor and Maclaurin series of functions, Leibniz formula for the  $n$ th derivative of the product of two functions (No proof), use of Leibniz formula for the determination of coefficients of the power series.

### Module III

**Partial differentiation:** Partial differentiation-Concept of partial derivative - Chain rule- Total derivative- Euler's theorem for homogeneous functions, Differentials and their applications in errors and approximations, Jacobians - Maxima minima of functions of two variables(Proof of the result not required)-Simple applications.

**Co-ordinate systems:** Rectangular co-ordinates-Polar co-ordinates-In plane and in Space-Cylindrical polar co-ordinates-Spherical polar co-ordinates.

### Module IV

#### Integral calculus:

Application of definite integrals: Area, Volume, Arc length, Surface area.

Multiple integrals : Evaluation of double integrals-Change of order of integration. Evaluation of triple integrals-Change of Variables in integrals.

Applications of multiple integrals. Plane Area, Surface area & Volumes of solids

#### References:

1. S.S.Sastry, Engineering Mathematics -Vol1, Prentice Hall India, 2009.
2. Erwin Kreyzig, Advanced Engineering Mathematics, 10<sup>th</sup> edition, Wiley, 2011.
3. T. Veerarajan, Engineering Mathematics, 3<sup>rd</sup> Edition, Tata McGraw Hill Publishers, 2011
4. B.S.Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers, 2013.

#### *Type of Questions for End Semester Exam.*

*Q 1.Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B.(4 x 10 = 40 marks)*

## 1101B/ 1201A COMPUTER PROGRAMMING

### Objectives

- To learn the fundamentals of computers
- To learn the problem solving techniques writing algorithms and procedures
- To learn the syntax and semantics for C programming language
- To develop the C code for simple logic
- To understand the constructs of structured programming including conditionals and iterations

### Expected Outcome

- Ability to write algorithms for problems
- Knowledge of the syntax and semantics of C programming language
- Ability to code a given logic in C language
- Knowledge in using C language for solving problems

### Module I

#### Basics of Computer and Information Technology:

Digital Computer System (CPU, Memory, I/O devices)- Working of a digital computer- Hardware and Software : Definition - Categories of Software, Application of Computers – Role of Information Technology – Internet Services

#### Problem Solving Methodology:

Problem statement, Analysis, Design a solution, Implement/Coding the solution, Test the solution, Design tools (Algorithm, Flow-chart, Pseudo-code)- Develop algorithms for simple problems.

#### Programming Languages:

Types and generation of programming languages- Compiler – Interpreter-Linker –Loader – Execution of Program

### Module II

#### Basics of C:

Character set-Identifier- Keywords- Constants –Data Types- Variables and declaration – Operators and Expressions – Operator precedence and associativity – Expression Evaluation (Simple Examples) - Input and output functions – Simple computational problems involving the above constructs.

#### Control Statements:

Selection, Conditional operator, Iteration (for, while, do-while), Branching (switch, break, continue, goto), Nesting of control statements- Problems using control statements.

### Module III

#### Arrays and Strings:

1D and 2D arrays –Searching (Linear and Binary) - Sorting (Bubble, Selection) – Matrix manipulation programs – Strings and basic operations on strings – Strings functions - Programs on string manipulation

#### Functions:

Definition – Calling – Declaration – Parameter Passing (by value and by reference) – Recursion – Library functions –Programs based on functions

#### User defined data types:

Structure – Union - Enumerated data type - Programs involving structure and union.

## Module IV

### Pointers:

Declaration, Initialization – Pointers and arrays – Pointers and structures – Pointers and functions – Command line arguments – Dynamic memory allocation – Operations on pointers – Programs involving the above concepts

### Files:

File concept – File pointer – File handling operations (open, close, read, write etc) on sequential and random access files. Programs on file manipulations using fgetc(), fgets(), fseek.

### References:

1. Pradip Dey and Manas Ghosh, Computer Fundamentals and Programming in C, Second Edition, Oxford University Press, 2013.
2. Smarajit Ghosh, All of C, PHI Learning Pvt. Ltd, 2009.
3. Byron Gottfried, Programming with C, 2<sup>nd</sup> edition, Tata McGraw-Hill, 2006.
4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Second Edition, Pearson Education, 2001.
5. R.G. Dromey, How to solve it by Computer, Pearson Education, 2008.
6. Sukhendu Dey, Debabrata Dutta, Complete Knowledge in C, Narosa Publishing House, New Delhi, 2009.
7. Kanetkar Y, Let Us C, BPB Publications, 2007
8. Varghese Paul, Computer Fundamentals, Second Edition, Educational Publishers & Distributors, Ernakulam, 2007.
9. Jose Surendran, Introduction to Computer Programming in C, Pentagon Educational Services, Kollam, 2013.

### ***Type of Questions for End Semester Exam.***

*Q 1.Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B.(4 x 10 = 40 marks)*



## 1102A / 1202B ENGINEERING PHYSICS

### Objectives

To make a bridge between the physics in school and engineering courses.

To introduce the basic concepts of modern science like Photonics, Engineering applications of acoustics, fundamentals of crystal physics and materials science.

### Expected Outcome

The student will be able to understand many modern devices and technologies based on lasers and optical fibers. Student can also appreciate various material properties which are used in engineering applications and devices.

### Module 1

**Laser-introduction**--spontaneous and stimulated emission-principle of laser- properties of laser-Einstein coefficients and the analysis of lasing conditions- Basic components of a laser-Different types of lasers- construction,working and applications of Ruby laser- Neodymium YAG laser- He-Ne laser- semiconductor laser-Applications of laser in medicine, industry, science and communication.

**Holography**-basic principle-Comparison with ordinary photography-Recording and reconstruction of holograms-applications.

**Fibre optics** - Basic structure of an optical fibre - step-index fibre and graded index fibre-propagation of light in an optical fibre-acceptance angle and acceptance cone- Numerical aperture of a step-index fibre-Numerical aperture of a graded index fibre-modes of propagation-step index monomode fibre-Multimode stepindex fibre- Graded multimode fibre-Attenuation in optic fibres-fibre losses-material loss,scattering loss,absorption loss,leaky modes- dispersion in optical fibres- Applications.

### Module II

**Crystallography** – Space lattice- Basis- Unit cell- Unit cell parameters- Crystal systems- Bravais lattices-Three cubic lattices-sc, bcc, and fcc- Number of atoms per unit cell- Coordination number- Atomic radius-Packing factor- Relation between density and crystal lattice constants- Lattice planes and Miller indices-Separation between lattice planes in sc- Bragg's law- Bragg's x-ray spectrometer- Crystal structure analysis.

**Liquid crystals**- Liquid crystals, display systems-merits and demerits- Metallic glasses- Types of metallic glasses (Metal-metalloid glasses, Metal-metal glasses) – Properties of metallic glasses (Structural, electrical,magnetic and chemical properties).

Shape memory alloys- Shape memory effect, pseudo elasticity

### Module III

**Introduction to nanoscale science and technology**- nanostructures-nanoring, nanorod, nanoparticle,

nanoshells- Properties of nanoparticles- optical, electrical, magnetic, mechanical properties and quantum confinement- Classification of nanomaterials- C60, metallic nanocomposites and polymer nanocomposites-Applications of nanotechnology.

**Superconductivity**-Introduction--transition temperature-Meissner effect-properties of superconductors.Types of superconductors-type 1 and type 2- AC Josephsons effect- DC Josephsons effect- Flux quantisation-Squid-High temperature superconductors-Applications of super conductivity.

**Special Theory of Relativity** - Michelson-Morley experiment. Einstein's postulates. Lorentz transformation equations (no derivation). Simultaneity. Length contraction. Time dilation. Velocity addition. Relativistic mass. Mass energy relation. Mass less particle.

### Module IV

**Quantum mechanics**-Introduction-origin of quantum theory-black body radiation and photo electric effect (brief ideas only)-matter waves- wave packet-uncertainty principle-(two

forms) Time dependent Schrodinger equation for a free particle-Particle in force field and time dependent Schrodinger equation-Time independent schrodinger equation-Physical interpretation of wave function-application -Particle in a Box (one dimensional) -Energy eigen values and wave functions **Ultrasonics**-piezo electric effect-Magnetostriction effect-production of ultrasonics-properties of ultrasonics- ultrasonic diffractometer and determination of velocity of ultrasonics in a liquid-Application of ultrasonics in non destructive testing - Acoustics of building-reverberation- Absorption Coefficient- Sabines formula for reverberation time(Derivation)-Acoustic intensity- loudness-decibel-phon-conditions for good acoustics(Qualitative study).

#### References:

1. S. Mani Naidu, A Text book of Engineering Physics, Pearson, 2010
2. A.S. Vasudeva, Modern Engineering Physics, S. Chand & Co, 2013.
3. Prabir K. Vasu and Hrishikesh Dhasmana, Engineering Physics, Ane books Pvt. Ltd., 2010.
4. S.O. Pillai & Sivakami, Applied Physics, New Age International (P) Ltd., Second Edition, 2008.
5. G.S. Raghuvanshi, Engineering Physics, Prentice Hall of India, 2008.
6. M.C. Santosh Kumar, Engineering Physics, Nalpat Publishers, 2012.
7. B. Premlet, Advanced Engineering Physics, Phasor Books, Kollam, 2013.

#### ***Type of Questions for End Semester Exam.***

*Q 1.Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B.(4 x 10 = 40 marks)*

## 1102B / 1202A ENGINEERING CHEMISTRY

### Objectives

To introduce the students to basic principles of solid state chemistry, electrochemistry, spectroscopy, corrosion, chemical kinetics, phase equilibrium and engineering materials of importance.

### Expected Outcome

Students would have learnt the significance of electrochemistry and its application, corrosion, chemical kinetics, engineering materials of importance and polymer.

### Module I

**Solid state chemistry:** Fundamentals, Bonding in solids, Born-Haber cycle, Point defects, Methods to improve reactivity of solids, Free electron theory, Band theory, Fermi level in semiconductors, Molecular field theory of magnetic materials.

**Spectroscopy:** Molecular energy levels-Types of molecular spectra- Electronic spectra (Classification of electronic transitions- Beer Lamberts law, Vibrational spectra (mechanism of interaction and application), Rotational spectra (Determination of bond length and application). NMR spectra (Basic principle, chemical shift, spin-spin splitting)

**Solid surface characterisation:** Electron spectroscopy for chemical analysis, Chemical shift, BET isotherm, Thermodynamics of adsorption.

### Module II

**Electrochemistry:** Fundamentals, Electrode potential, Nernst's equation, Types of electrodes, Salt bridge, E.M.F measurement. Concentration cells, Calculation of E.M.F of a concentration cell.

Acids and bases, Arrhenius concept, Bronsted-Lowry concept of acids and bases, Lewis concept, Buffer solutions, pH measurement, Polarisation, Overvoltage.

Power generation: Secondary cells, Fuel cells, Photovoltaic effect, Solar cells.

Corrosion and its control: Theories of corrosion - Galvanic series- Types of corrosion - Factors affecting corrosion and different methods of corrosion control.

**Chemical Kinetics:** reaction rate, rate constant, rate law, reaction order, first order, second order, pseudo-first order reactions, integrated rate laws, half-life of a reaction and its relation to rate constant. Molecularity, simple unimolecular and bimolecular reactions. Arrhenius equation.

### Module III

**Chemical Thermodynamics:** Fundamentals, Molecular interpretation of internal energy, enthalpy and entropy, Heat of reaction, Kirchhof's equation, Trouton's rule, Entropy changes accompanying different processes, Nernst heat theorem, Third-law.

**Free energy:** Dependence on pressure and temperature, Gibbs-Helmholtz equation, Free energy changes and equilibrium constant, chemical potential, Fugacity, Thermodynamics of biochemical reactions.

**Phase Rule:** Terms involved in phase rule and examples, Application of phase rule to one component water system, Application of phase rule to two-component systems.

### Module IV

#### Engineering materials:

Polymers- Classifications- Mechanism of polymerisation (Addition, free radical, cationic, anionic and coordination polymerisation)- Thermoplastics and thermosetting plastics- Compounding of plastics-Moulding techniques of plastics (Compression, Injection, Transfer and Extrusion moulding)-Preparation, properties and uses of PVC, PVA, Nylon, PET -

Silicon polymers- Biodegradable plastics. Elastomers- structure of natural rubber- vulcanisation- synthetic rubbers (Buna-S, Butyl rubber and Neoprene).

Lubricants- Introduction-Mechanism of lubrication- solid and liquid lubricant- Properties of lubricants-Viscosity index- flash and fire point- cloud and pour point- aniline value.

Refractories: Classification – Properties of refractories.

Cement- Manufacture of Portland cement- Theory of setting and hardening of cement.

### References:

1. Peter Atkins, Julio de Paula, Elements of Physical Chemistry, Oxford University Press, 2005.
2. John E. McMurry and Robert C. Fay, Chemistry, 5<sup>th</sup> Edition, Pearson, 2008.
3. O. G Palanna, Engineering Chemistry, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009.
4. R.N. Goyal, Harmendra Goel, Textbook of Engineering Chemistry, 2<sup>nd</sup> Edition, Ane Books Pvt. Ltd., 2011.
5. R Gopalan, D Venkappayya, Sulochana Nagarajan, Textbook of Engineering Chemistry, 2<sup>nd</sup> Edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.
6. Shashi Chawla, A Text Book of Engineering Chemistry, Dhanpat Rai & Co, New Delhi, 2003.
7. Kochubaby Manjooran, Modern Engineering Chemistry, Kannantheri Publication, Kochi, 2012.

### ***Type of Questions for End Semester Exam.***

*Q 1.Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B.(4 x 10 = 40 marks)*

## 1103A / 1203B ENGINEERING MECHANICS

### Objectives

1. To introduce mechanics as a common subject to all branches of engineering and oriented towards engineering applications.
2. To inculcate the ability of formulating, analysing and solving an engineering problem through the application of the principles of mechanics.
3. To discuss the subject content as a foundation course for many follower courses distributed in various engineering disciplines.
4. To eradicate an expected fearful approach of a student towards the study of mechanics and to encourage him/her to pursue further in follower courses in mechanics.
5. To directly introduce the importance and concept of the quantities, like, centroid, moment of inertia, relative velocity and acceleration, projectile motion, equilibrium equations, etc., in nearly all disciplines of engineering.

### Expected Outcome

The terminal objectives of the course is that, on successful completion of teaching-learning and evaluation activities, a student would be able to identify and analyse the problems by applying the fundamental principles of engineering mechanics and to proceed to research, design and development of engineering systems.

### A) STATICS

#### Module I

**Introduction to Mechanics:** Definition of mechanics, classification of mechanics – rigid body and deformable body mechanics, division of rigid body mechanics – statics and dynamics, Applications of mechanics in engineering practice.

**Forces and Force systems:** Force and its characteristics, Principles of statics – concept of resultant and equilibrant, Composition and resolution of forces, force systems.

**Coplanar Concurrent force system:** Equilibrium – two forces, three and more than three forces, concept of moment of a force, equations of equilibrium, Friction and its effects on bodies, Solutions of problems involving equilibrium of coplanar concurrent forces.

**Coplanar Parallel force System:** Two parallel forces, General case of parallel forces in a plane, Centre of parallel forces, Centre of gravity, Centre of mass, Centroids of curves, areas and volumes – regular and composite, Pappus's theorems, Equilibrium of distributed forces in a plane, Applications of the concept of centroid in engineering practice.

#### Module II

**Moment of Inertia:** Concept of moment of inertia and second moment of area, Mass moment of inertia of regular and composite solids, Second moment of area of regular and composite surfaces, Polar moment of inertia / second moment of area, Product of inertia, Principal moments of inertia and principal axes, Applications of the concepts in engineering practice.

**Coplanar non-concurrent force system:** Resultant of a general case of force system in a plane, Equilibrium equations, Applications in engineering practice.

**Analysis of Plane trusses and frames:** Concept of load carrying mechanism in trusses and frames – internal (axial) forces, two force and multi force members, Analysis of plane trusses by Method of joints and Method of sections, Analysis of Plane frames by Method of members, Applications of trusses and frames in structures.

**Principle of virtual work:** Concept of virtual work and the principle of virtual work, Applications in engineering, Equilibrium of ideal systems, Stable and unstable equilibrium.

## B) DYNAMICS

### Module III

**Introduction to Dynamics:** Definitions, Units, Divisions – Kinematics, Kinetics.

**Rectilinear translation:** Kinematics of rectilinear motion – displacement, velocity, acceleration, Kinetics – Differential equation of rectilinear motion, Motion of a particle due to a constant force, Motion of a particle due to a force proportional to displacement – Simple harmonic motion. The D'Alembert's principle in rectilinear translation and its applications, Momentum and impulse, Work and energy, Ideal systems, Conservation of energy, Collision of two bodies – direct central impact.

### Module IV

**Curvilinear translation:** Kinematics of curvilinear translation – components of displacement, velocity and acceleration, normal and tangential acceleration, Kinetics – Differential equations of motion, Motion of a projectile – projection on horizontal and inclined surfaces, D'Alembert's principle in curvilinear motion and its applications, Moment of momentum, Work and energy in curvilinear motion.

**Rotation of a rigid body:** Kinematics of rotation – angular displacement, velocity and acceleration, rpm, Relations of kinematic parameters of linear and angular motions, Kinetics – Equation of motion of a rigid body rotating about a fixed axis, Rotation under the action of a constant moment, Rotation proportional to angular displacement – Compound pendulum, D'Alembert's principle in rotation, Resultant inertia force in rotation, Principle of angular momentum in rotation, Energy equation for rotating bodies.

## REFERENCE

1. Timoshenko and Young, Engineering Mechanics, McGraw Hill Book Company, Singapore, 1956.
2. Beer F. P. and Johnston E. R, Mechanics for Engineers (Vol. 1- Statics and Vol.2 - Dynamics), Tata McGraw Hill, 2004.
3. Merriam H. L. & Kraige L. G, Engineering Mechanics (Vol. 1- Statics and Vol.2 - Dynamics), John Wiley and Sons, 2003.
4. Rajasekaran.S, Sankarasubramanian.G., Fundamentals of Engineering Mechanics, 3<sup>rd</sup> Edition, Vikas Publishing House Pvt. Ltd.,2010.
5. Hibbeler, R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, 12<sup>th</sup> Edition, Pearson Education Asia Pvt. Ltd.,2010.
6. Biju N, Engineering Mechanics, Educational Publishers & Distributors, 2014.

### ***Type of Questions for End Semester Exam.***

*Q 1.Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B.(4 x 10 = 40 marks)*

## 1103B/ 1203A ENGINEERING GRAPHICS

### Objectives

Irrespective of engineering discipline, it has become mandatory to know the **basics of Engineering graphics**. The student is expected to possess the efficient drafting skill depending on the operational function in order to perform day to day activity.

Provide neat structure of industrial drawing

Enables the knowledge about position of the component and its forms

Interpretation of technical graphics assemblies

Preparation of machine components and related parts

### Expected Outcome

Towards the end of the course it is expected that the students would be matured to visualize the engineering components. A number of chosen problems will be solved to illustrate the concepts clearly.

### Module I

**Introduction to engineering graphics.** Drawing instruments and their use. familiarisation with current Indian Standard Code of Practice for general engineering drawing.

Scales- plain scale ,vernier scale, diagonal scale.

Conic sections- Construction of ellipse, parabola, hyperbola - construction of cycloid, involute, archimedian spiral and logarithmic spiral- drawing tangents and normals to these curves.

### Module II

**Introduction to orthographic projections-** plane of projection- principles of first angle and third angle projections, projection of points in different quadrants.

Orthographic projection of straight lines parallel to one plane and inclined to the other plane- straight lines inclined to both the planes- true length and inclination of lines with reference planes- traces of lines.

Projection of plane laminae of geometrical shapes in oblique positions.

### Module III

**Projection of polyhedra and solids of revolution-** frustum, projection of solids with axis parallel to one plane and parallel or perpendicular to other plane- projection of solids with axis inclined to both the planes- projection of solids on auxiliary planes.

Section of solids by planes inclined to horizontal or vertical planes- true shape of sections.

### Module IV

**Development of surface** of cubes, prisms, cylinders, pyramids and cones

**Intersection of surfaces-** methods of determining lines of intersection - intersection of prism in prism and cylinder in cylinder.

### Module V

**Introduction to isometric projection-** isometric scales, isometric views- isometric projections of prisms, pyramids, cylinders, cones and spheres.

**Introduction to perspective projections :** visual ray method and vanishing point method- perspective of circles- perspective views of prisms and pyramids.

**References:**

1. K.C. John. Engineering Graphics, PHI Learning, 2013.
2. N.D.Bhat , Elementary Engineering Drawing, 49<sup>th</sup> Edition, Charotar publishing House, 2010.
3. P.S.Gill , Geometric Drawing, B.D Kataria & Sons, Ludhiana, 2012.
4. P I Varghese, Engineering Graphics, VIP Publishers, 2013.

**End Semester Examination Question Paper pattern**

*Two questions of 12 marks each from all the five modules. Answer one question from each module. (5x12 = 60 marks)*



## 1104A / 1204B BASIC CIVIL ENGINEERING

### Objectives

1. To give an overview of the fundamentals of the Civil Engineering fields to the students of all branches of Engineering
2. To realize the importance of the Civil Engineering Profession in fulfilling societal needs

### Expected Outcome

1. The students will gain knowledge on site selection, construction materials, and components of buildings.
2. A basic appreciation of multidisciplinary approach when involved in Civil Related Projects.

### MODULE I

**Engineering Materials:** Cement - varieties and grade of cement and its uses. Cement mortar- Steel- types of steel for reinforcement bars, steel structural sections. Brick- varieties and strength, tests on bricks.

Aggregates- types & requirements. Concrete- grades of concrete as per IS code, water cement ratio, workability, mixing, batching, placing, compaction and curing.

### MODULE-II

**Construction :** Foundation- types of foundations- isolated footing, combined footing, raft, pile & well foundations- Foundation for Machinery

Super structure: Brick masonry, English bond and Flemish bond, Stone masonry-Ashlar masonry- Rubble masonry. Roofing- Steel trusses, roofing for industrial buildings

### MODULE-III

**Surveying:** Principles, instruments, ranging and chaining of survey lines, field work, field book, reconnaissance. Selection of survey stations,

Leveling: Leveling instruments, different types, temporary adjustments, reduced level of point, booking of field notes, and reduction of levels by height of collimation method.

### MODULE-IV n

**Site planning and Building Rules**-Selection of site-Site plan preparation for buildings-Kerala Municipal Building Rules (1999)-general provisions regarding site and building requirements-Coverage and Floor Area Ratio-Basic concepts of Intelligent Buildings and Green Buildings

Roads- Classification of Rural and urban Roads.

Sources of Water - Water Supply- Quality of Water.

### REFERENCES

1. S.C. Rangawala, Engineering Materials, 41<sup>st</sup> Edition, Charotar Publishing House, Anand, 2014.
2. Surendra Singh, Building Materials, Vikas Publishing Company, New Delhi, 1996.
3. S.C. Rangawala, Building Construction, 32<sup>nd</sup> Edition, Charotar Publishing House, Anand, 2014.
4. P. Kanetkar, Surveying and Levelling, Volumes 1 and 2, United Book Corporation, Poona, 1994.
5. Kerala Municipal Building Rules-1999
6. Punmia, B.C, Ashok Kumar Jain, Arun Kumar Jain, Basic Civil Engineering, Laxmi Publishers, 2012.
7. Roy M. Thomas, Fundamentals of Civil Engineering, Educational Publishers & Distributors, Ernakulam, 2012.

***Type of Questions for End Semester Exam.***

*Q 1. Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B. (4 x 10 = 40 marks)*

## 1104B/1204A BASIC ELECTRICAL ENGINEERING

### Objectives

To impart a basic knowledge in Electrical Engineering with an understanding of fundamental concepts.

### Expected outcome

The course will enable the students to gain preliminary knowledge in basic concepts of Electrical Engineering.

### Module I

**Basic principles of Electric circuits:** Review of Ohm's law - Definition of Resistance, Current, Voltage and Power - Series and Parallel circuits- Constant voltage source and Constant current source.

**Network Theorems:** Kirchhoff's laws- Network analysis by Maxwell's circulation currents - Superposition theorem -Thevenin's theorem - Norton's theorem - simple illustrative problems on network theorems.

**Review of electrostatics** - Coulomb's Law- Electric field strength and electric flux density, Capacitance.

### Module II

**Review of electromagnetic induction** -Faraday's Law- Lenz's Law - Mutually induced emf. Magnetic circuits - Magnetic field of a coil - Ampere turns calculation - Magnetic flux - Flux density - Field strength.

**Measuring instruments:** Working principle of galvanometer, Ammeter, Voltmeter, Watt meter & Energy Meter (elementary concepts).

### Module III

**AC Fundamentals:** Sinusoidal Alternating Waveforms - Sinusoidal AC Voltage characteristics and definitions – Frequency spectrum– General format for the sinusoidal voltage of current – Phase Relations – Average value – Effective (Root mean square) value.

**The Basic Elements and Phasors:** Response of basic R,L and C elements to a sinusoidal voltage or current – Frequency response of the basic elements – Average power and power factor – complex numbers – Rectangular form – Polar form – Conversion between forms.

**Series and Parallel ac Circuits:** Impedance and the Phasor Diagram- series configuration – voltage divider rule –frequency response for series ac circuits –Admittance and susceptance – parallel ac networks – current divider rule – frequency response of parallel elements.

**Introduction to 3 phase Systems:** Star- Delta connection

### Module IV

**Electrical Machines:** Principle of operation, Types and applications of DC machines, Transformers and Induction Machines. (Only an elementary qualitative treatment is envisaged.)

**Elementary Concepts of Generation, Transmission, and Distribution:** Various levels of power transmission – conventional sources of electrical energy, Hydro, Thermal, Nuclear and Diesel power station - introduction to primary and secondary distribution

### REFERENCES

1. Boylestad, Introductory Circuit analysis, 12<sup>th</sup> Edition, Pearson Education, 2012.
2. H. Cotton, Electrical Technology, 7<sup>th</sup> Edition, CBS Publishers and Distributors, 2005.

3. Leonard S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 1996.
4. Rajendra Prasad, Fundamentals of Electrical Engineering, 2<sup>nd</sup> Edn, PHI Learning, 2009
5. Edward Hughes, Electrical Technology, Addison Wesley Longman, 1995.

***Type of Questions for End Semester Exam.***

*Q 1. Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B. (4 x 10 = 40 marks)*

## 1105A/1205B BASIC MECHANICAL ENGINEERING

### Objectives

1. To give an overview of the fundamentals of the Mechanical Engineering fields to the students of all branches of Engineering
2. To realize the importance of the Mechanical Engineering Profession in fulfilling societal needs

### Outcome:

The terminal objectives of the course is that, on successful completion of teaching-learning and evaluation activities, a student would be able to identify, appreciate and analyze the problems by applying the fundamentals of mechanical engineering and to proceed for the development of the mechanical systems.

### Module 1

**Thermodynamics:** Thermodynamics systems – open, closed and isolated systems, equilibrium state of a system, property and state, process, cycle, Zeroth law of thermodynamics- concept of temperature, temperature scales. First law – internal energy, enthalpy, work and heat, Different processes, isobaric, isochoric, isothermal and adiabatic processes. Second law – Kelvin-planck and Clausius statements, Carnot Cycle. Simple problems only.

Properties of Steam & Steam Generator. Different types of boilers, boiler mountings and accessories. Formation of steam at constant pressure, Thermodynamic properties of Steam, working of steam turbines, compounding of turbines.

### Module 2

**Internal Combustion Engines:** Air standard cycles – Otto and Diesel cycles, working of two stroke and four stroke Petrol and Diesel engines, Carburetted and MPFI engines, fuel pump, fuel injector, ignition system, cooling system, lubricating system.

**Refrigeration & Airconditioning:** Introduction to refrigeration and air -conditioning, Rating of refrigeration machines, Coefficient of performance, Simple refrigeration vapour compression cycle, summer and winter air conditioning.

### Module 3

**Hydraulic Turbines & Pumps :** Introduction, Classification, Construction details and working of Pelton, Francis and Kaplan turbines, Specific speed and selection of turbines, Classification of water pumps, working of centrifugal pumps and reciprocating pumps (elementary ideas only)

**Power plants:** Hydro-electric power plants, Thermal power plants, Nuclear power plants, Diesel power plants, Wind mills, solar energy (Schematic representations only)

**Industrial Engineering:** Definition and history of Industrial Engg, contributions of F W Taylor, Henry Foyal, Gilberth, and Henry Gannt towards Industrial Engineering, basic concepts of time and motion study, productivity, organizational performance, pricing, and depreciation.

### Module 4

**Introduction to Manufacturing Systems:** Welding- different types of welding, resistance welding, arc welding, gas welding, Brazing and soldering. Different welding defects. Casting- different casting processes, sand casting, casting defects, Rolling- hot rolling and cold rolling, two high, three high, cluster rolling mills, wire drawing, forging, extrusion, Heat treatment of steel, elementary ideas of annealing, hardening, normalizing, surface hardening.

**Power Transmission Methods and Devices:** Introduction to Power transmission, Belt, Rope, Chain and Gear drive. Length of belt open and crossed. Ratio of belt tensions. Different types of gears (elementary ideas only). Types and functioning of clutches.

## References

1. Nag P.K, Engineering Thermodynamics, Fifth Edition, McGraw Hill Education (India) Pvt. Ltd, 2013.
2. J.P. Holman, Thermodynamics, 3<sup>rd</sup> Edition, Mc Graw Hill, 1995.
3. Rogowsky, Elements of Internal Combustion Engines, Tata McGraw Hill, 1986.
4. Gill J.H, Smith Jr, and E J Ziurys, Fundamentals of Internal Combustion Engines, Oxford & IBH, 1959.
5. Stoecker W F, Refrigeration and Air Conditioning, Tata McGraw Hill, 1980.
6. V Raghavan, Material Science and Engineering, Prentice Hall of India, 2004.
7. Jagadish Lal, Hydraulic Machines, Metropolitan Book co, New Delhi, 1994.
8. Rajendar Singh, Introduction to Basic Manufacturing Processes and Workshop Technology, New Age International, 2006.
9. S. Dalela, Mansoor Ali, Industrial Engineering and Management, Standard Publishers & Distributors, 2010.

## ***Type of Questions for End Semester Exam.***

*Q 1. Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B. (4 x 10 = 40 marks)*

## 1105B/1205A BASIC ELECTRONICS ENGINEERING

### Course Objectives

1. To get basic idea about types, specification and common values of passive components.
2. To familiarize the working and characteristics of diodes, transistors, and some measuring instruments.
3. To understand working of diodes in circuits and in rectifiers.

### Expected outcome

Student can identify the active and passive electronic components. Student can setup simple circuits using diodes and transistors. Student will get fundamental idea about basic communication systems and entertainment electronics

### Module I

**Semiconductor Physics:** Basic concepts, Intrinsic and extrinsic semiconductors, diffusion and drift currents, p-n junction under open-circuit, reverse bias and forward-bias conditions, p-n junction in the breakdown region,

**The Diode** - Biasing the Diode, Voltage - Current Characteristic of a Diode, Diode Models, **Diode Applications** - Half Wave and Full Wave Rectifiers, Power supply Filters and Regulators, **Special Purpose Diodes** - Zener Diodes- Applications, Varactor Diodes, Optical Diodes-Other Types of Diodes. **Bipolar Junction Transistors (BJTs)** - Transistor Structure - Basic Transistor Operation, Transistor characteristics and parameters, Transistor as an Amplifier, Transistor as a Switch.

### Module II

**Amplifiers:** Introduction of different types of amplifiers and their characteristics, Principle of amplification.

**Oscillators:** Criteria for oscillations, Qualitative analysis of LC, RC and Crystal Oscillators.

**Power Supplies:** Introduction and Working of Switched Mode Power Supply (SMPS), Voltage Regulator, Introduction to Inverters and UPS.

### Module III

**Digital Electronics:** Binary, Octal and Hexadecimal number systems and conversions, Boolean Algebra, Truth tables of logic gates (AND, OR, NOT), NAND, NOR as universal gates, Difference between combinational circuits and sequential circuits. **Introduction to microprocessors:** classification, architecture, instructions, computer organization. **Sensors-** Temperature, light, force and sound sensors; **Actuators** – Heat, Light, force and sound actuators. **Electronic measurements** - measurements of voltages and currents, voltmeter, ammeter, multimeter, CRO (Block level treatment only)

### Module IV

**Introduction to signal processing:** Signals and Systems- classification-properties, Sampling & quantization, transforms, spectrum, filters.

**Introduction to Electronic Communication systems:** Modulation and Demodulation, Analog communication system, Electromagnetic frequency spectrum, Bandwidth and information capacity, Principles of Amplitude and angle modulation, Bandwidth requirements of angle modulated waves.

### References:

1. Thomas L. Floyd, Electronic Devices, 7<sup>th</sup> Edition, Pearson Education Inc., 2008.
2. Neil Storey, Electronics: A Systems approach, Pearson Education Inc. 2011

3. Wayne Tomasi, Electronic Communication Systems: Fundamentals through Advanced, 5<sup>th</sup> Edition, Pearson Education Inc., 2009.
4. Tocci R J and Widmer N S, Digital Systems – Principles and Applications, 8th Edition., Pearson Education India, New Delhi, 2001.
5. James H. McClellan, Ronald W. Schafer, Mark A. Yoder, Signal Processing First, Pearson Education, 2003.

***Type of Questions for End Semester Exam.***

*Q 1. Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B. (4 x 10 = 40 marks)*



## 1106A/1206B ENVIRONMENTAL STUDIES

### Objective

To make the student aware of the need for sustainable development.

To familiarize the student with the various problems facing the environment like pollution, loss of habitat, solid waste disposal, degradation of environment, over use of resources, global warming, the depletion of ozone layer and loss of biodiversity

### Expected Outcome

On successful completion of the teaching-learning and evaluation activities, a student would be able to identify, appreciate and analyze the various issues threatening the environment. It would also create a pro-environmental attitude and a behavioral pattern in the student that is based on sustainable lifestyles.

### Module I

Multidisciplinary nature of environmental studies. Definition, scope and importance, need for public awareness.

Natural Resources : Renewable and non-renewable resources : Natural resources and associated problems. a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

### Module II

**Ecosystems:** Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystems :- a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Biodiversity and its conservation:** Introduction – Definition : genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

### Module III

**Environmental Pollution:** Definition. Cause, effects and control measures of :- a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards. Solid waste Management : Causes, effects and control measures

of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.

**Disaster management** : floods, earthquake, cyclone and landslides.

**Environmental legislation**: Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation.

#### Module IV

**Environmental ethics** : Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products.

**Social Issues and the Environment**: From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case Studies. Public awareness.

**Human Population and the Environment**: Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Case Studies.

Field work: Visit to a local area to document environmental assets river/forest/grassland/hill/mountains. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

#### References:

1. Rajagopalan. R, Environmental Studies: From Crisis to Cure, Oxford University Press, 2005
2. Erach Bharucha, Textbook of Environmental Studies and Ethics, Universities Press (India), Hyderabad, 2005.
3. Jayashree A. Parikh, V.M. Balsaraf, P.B. Dwivedi, Environmental Studies, Ane Books Pvt. Ltd., 2010.
4. Anindita Basak, Environmental Studies, Pearson, 2009.
5. Gouri Suresh, Environmental Studies and Ethics, I.K. International Publishing House Pvt. Ltd., New Delhi, 2007.
6. S.P. Misra, Essential Environmental Studies, 3<sup>rd</sup> Edition, Ane Books Pvt. Ltd., 2011.
7. Benny Joseph, Environmental Science & Engineering, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
8. Meenambal T , Uma R M and K Murali, Principles of Environmental Science and Engineering, S. Chand & Company Ltd, 2005

#### ***Type of Questions for End Semester Exam.***

*Q 1.Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B.(4 x 10 = 40 marks)*

## 1106B/ 1206A TECHNICAL COMMUNICATION & PROFESSIONAL ETHICS

### Objectives

The primary objective is to develop in the under-graduate students of engineering a level of competence in English required for independent and effective communication for their professional needs. It is also intended to develop awareness about the role of ethics in the practice of engineering profession.

### Expected Outcome

The students will have knowledge of the various uses of English in their professional environment and they will be able to communicate themselves effectively in their chosen profession. The students will also have knowledge about the ethical principles of engineering profession.

### Module I

**Remedial Grammar** :Errors of Accidence and syntax with reference to Parts of Speech; Agreement of Subject and Verb; Tense and Concord; Conditional Clauses; Use of connectives in Complex and Compound sentences; Question tags and short responses. Word Formations (by adding suffixes and prefixes); Technical Word Formation; Synonyms, Antonyms, Homophones, and Homonyms; One Word Substitution; Misappropriations; Indianisms; Redundant Words; Phrasal Verb Idioms.

Elementary Phonetics (Speech Mechanism, The Description of Speech Sounds, The Phoneme, the syllable; Prosodic Features, Word Accent, Features of Connected Speech); Paralanguage and Body language; and Classroom Presentations, Hearing and Listening; Essentials of Good Listening: Achieving ability to comprehend material delivered at relatively fast speed.

### Module II

**Oral Communication**: Starting and ending a conversation; telling and asking people to do things; expressing opinions and ideas, decisions and intentions, offers and invitations, feelings, right and wrong, numbers and money.

Purpose and audience; dealing with customers and clients; face-to-face discussions; meetings and attending meetings; checking understanding; raising questions; giving and receiving feedback; using body language; leading and directing discussions; concluding discussions; using graphics in oral presentations

Group Discussion: Use of persuasive strategies including some rhetorical devices for emphasizing (for instance; being polite and firm; handling questions and taking in criticism of self; turn-taking strategies and effective intervention; use of body language).

**Reading Comprehension and reference skills**: Skimming and scanning; factual and inferential comprehension; prediction; guessing meaning of words from context; word reference; comprehending graphics in technical writing.

Reading strategies; reading speed; reading between the lines for hidden meaning; interpreting graphics; using a dictionary; using an index; using a contents list to find information; choosing the right reference source.

### Module III

**Written Communication**: note making and note taking; summarising; notes and memos; developing notes into text; organisation of ideas: cohesion and coherence; paragraph writing: ordering information in space and time; short essays: description and argument; comparison and contrast; illustration; using graphics in writing: tables and charts; diagrams and flow-charts; maps, plans and graphs.

Spelling rules and tips; writing a rough draft; editing and proof reading; writing the final draft; styling text; filling in complex forms; standard letters; CV; writing a report; writing leaflets and brochures; writing references; essay writing: expository writing; description of processes and products; classification; the instructional process; arguments and presentation of arguments; narrating events chronologically.

(Emphasis should be given to the practice sessions for developing the oral and written communication skills of students.)

#### **Module IV**

**Engineering ethics:** Senses of Engineering Ethics - Variety of moral issues - Types of inquiry - Moral dilemmas - Moral autonomy. Kohlberg's theory - Gilligan's theory - Consensus and Controversy - Professional ideals and virtues - Attributes of an ethical personality - Theories about right action - Self interest.

Responsibilities and Rights of engineers - Collegiality and Loyalty - Respect for authority - Collective bargaining. Confidentiality - Conflicts of interest - Professional rights.

#### **REFERENCES**

1. John Seely, Oxford Guide to Writing and Speaking, Oxford University Press.
2. C. Muralikrishna and Sunita Mishra, Communication Skills for Engineers, 2<sup>nd</sup> Edition, Pearson, 2011.
3. Meenakshi Raman and Sangeetha Sharma, Technical Communication: Principles and Practice, Oxford University Press, 2004.
4. Krishna Mohan and Meenakshi Raman, Effective English Communication, Tata McGraw Hill, 2000.
5. William Sanborn Pfeiffer, T.V.S. Padmaja, Technical Communication – A Practical Approach, Pearson, 2007.
6. R.C. Bhatia, Business Communication, 2<sup>nd</sup> Edition, Ane Books Pvt. Ltd., 2008.
7. Krishna Mohan and Meera Banerji, Developing Communication Skills, Mac Millan India Ltd, 2000.
8. Jayashree Suresh and B.S. Raghavan, Professional Ethics, S. Chand & Company Ltd, 2005
9. Edmund D. Seebaur & Robert L. Barry, Fundamentals of Ethics for Scientists and Engineers, Oxford University Press, 2001

#### ***Type of Questions for End Semester Exam.***

*Q 1. Ten short answer questions of 2 marks each with at least 2 questions from each of the four modules. (10x2 = 20 marks)*

*Q 2. to Q.5 : Two questions A & B of 10 marks from each module with option to answer either A or B. (4 x 10 = 40 marks)*

**The questions shall be framed in such a way that they test the grammatical and communication skills of the student.**

## 11L1A / 12L1B CIVIL ENGINEERING WORKSHOP

### Masonry:

Construction of English bond and Flemish bond – wall junction – one brick – one and a half brick –and two brick thick

### Plumbing:

Introduction to simple plumbing and sanitary fittings.

### Surveying:

Surveying instruments – chain – compass – levelling instruments

Familiarization of latest building materials and testing.

Students shall collect the list of various building materials used for the construction of a building including their market rate.

*Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50 % marks in the aggregate and 45 % minimum in the end semester examination for a pass.*

## 11L2A / 12L2B MECHANICAL ENGINEERING WORKSHOP

### Objectives

Introduction to manufacturing process and their applications. Familiarization of various tools, measuring devices, practices and machines used in various workshop sections.

Preliminary exercises for beginners in all the following shops. Specific models may be designed by the teachers.

- 1) Fitting Shop.
- 2) Sheet Metal Shop
- 3) Foundry Shop
- 4) Welding Shop
- 5) Carpentry Shop

*Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50 % marks in the aggregate and 45 % minimum in the end semester examination for a pass.*

**11L1B / 12L1A ELECTRICAL ENGINEERING WORKSHOP**

1. One lamp controlled by one switch
2. Series and parallel connections of lamps.
3. Stair case wiring.
4. Hospital Wiring.
5. Godown wiring.
6. Fluorescent lamp.
7. Connection of plug socket.
8. Different kinds of joints.
9. Winding of transformers.
10. Soldering practice.
11. Familiarisation of CRO.
12. Single Phase Distribution Board Wiring.

***Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50 % marks in the aggregate and 45 % minimum in the end semester examination for a pass.***

## 11L2B / 12L2A COMPUTER PROGRAMMING LABORATORY

### Application packages

#### Text Editor

1. To create a word document like an advertisement.
2. To illustrate the concept of mail merging in Word.

#### Spread Sheet

3. To create a spread sheet to analyse the marks of the students of a class and also to create appropriate charts.

#### Presentation Software

4. To create a presentation for the department using Power Point.

### C Programming Basics

#### Operators & Expressions

5. To write a simple menu driven calculator program using switch statement

#### IO Formatting

6. To write a program to print Pascal's triangle.

#### Decision Making

7. To write a program for electricity bill preparation.

#### Looping

8. To write a program to print the *sine* and *cosine* series.

#### Arrays

9. To write a program to perform Matrix multiplication.
10. To write a program to prepare and print the sales report.

#### String

11. To write a program to perform string manipulation functions like *string concatenations*, *comparison*, *find the length* and *string copy* without using library functions.
12. To write a program to arrange names in alphabetical order.

#### Functions

13. To write a C program to calculate the mean, variance and standard deviation using functions.
14. To write a C program to perform sequential and binary search using functions.

#### Recursion

15. To write a program to print the Fibonacci series and to calculate the factorial of the given number using functions.

#### Structures

16. To print the mark sheet of n students using structures.

#### Pointers

17. To write a program using pointers to access the elements of an array and count the number of occurrences of the given number in the array.

***Note: 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50 % marks in the aggregate and 45% minimum in the end semester examination for a pass.***



## 11 L3A / 12 L3B LANGUAGE LABORATORY

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

### Objectives:

1. To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
2. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams.
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
4. To train them to use language effectively to face interviews, group discussions, public speaking.
5. To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

### SYLLABUS :

The following course content is prescribed for the **English Language Laboratory** sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Preparing business letters
4. Preparing a resume
5. Conducting a meeting and writing the minutes
6. Writing a report
7. Situational Dialogues / Role Play.
8. Oral Presentations- Prepared and Extempore.
9. 'Just A Minute' Sessions (JAM).
10. Describing Objects / Situations / People.
11. Debate
12. Group discussion

**Note :** 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50 % marks in the aggregate and 45 % minimum in the end semester examination for a pass.

**11L4 A / 12 L4 B****NATIONAL SERVICE SCHEME (NSS)**

A student enrolling as member of NSS will have to complete 30 hours of training / social service to be eligible to earn the credits specified in the curriculum.

Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.

**NATURE CONSERVATION**

A student enrolling as member of the Nature Conservation Club will have to complete 30 hours of campus cleaning and greening activities to be eligible to earn the credits specified in the curriculum.

Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the activities and the extent of active involvement.

## AS 15-1301 LINEAR ALGEBRA AND TRANSFORM TECHNIQUES

### Course Objectives:

To acquire fundamental knowledge in linear algebra and transform techniques and apply in engineering disciplines.

### Course Outcomes:

On completion of this course the student will be able to

1. Solve linear system of equations and to determine Eigen values and vectors of a matrix.
2. Understand the concept of vector space and sub space.
3. Determine Fourier series expansion of functions and transform.
4. Solve linear differential equation and integral equation using Laplace transform.

### Module I

Linear Algebra 1: Rank of a matrix, solution of linear system of equations- existence, uniqueness, general form- Eigen values and Eigen vectors- properties of Eigen values- Diagonalization of a matrix- Cayley Hamilton theorem (without proof) Verification Finding inverse and power of a matrix using it- Quadratic form- orthogonal reduction of quadratic form to Canonical form.

### Module II

Linear Algebra 2: Vector space- subspace- Linear dependence and independence- Spanning of a subspace- Basis and Dimension . Inner product- Inner product spaces - Orthogonal and Orthonormal basis – Gram- Schmidt Orthogonalization process. Linear Transformation.

### Module III

Fourier analysis: Periodic function, Fourier series, Functions of arbitrary period, Even and odd functions, Half Range Expansion, Harmonic analysis, Complex Fourier Series, Fourier Integrals, Fourier Cosine and Sine Transform, Fourier Transform.

### Module IV

Laplace Transforms: Gamma functions and Beta function- Definition and properties, Laplace transforms. Inverse Laplace Transform, Shifting theorem, Transform of Derivative and Integrals, Solution of differential equation and integral equation using Laplace transform, Convolution, Unit step function, Second Shifting theorem, Laplace transform of periodic function.

### References:

1. Kreyszig, E. (2011). Advanced engineering mathematics (10th ed.). John Wiley, New York
2. Grewal, B.S, & Grewal, J.S (2013). Higher engineering mathematics (43rd ed.). Khanna, Delhi.
3. Hoffman, K., & Kunze, R. (1961). Linear algebra, Prentice-Hall. Englewood Cliffs, N.J.
4. Hsiung, C.Y, & Mao, G.Y (1998). Linear algebra. World Scientific, Singapore
5. Venkataraman, M.K (1999). Linear Algebra, The National Co

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1302 LOGIC DESIGN AND ELECTRONIC CIRCUITS

### Course Objectives:

To understand the conversion of number system and logic circuits, different types of sequential circuits and to have a better understanding of the wave shaping circuits.

### Course Outcomes:

On completion of this course the student will be able to

1. Represent different number systems, circuits and logic gates
2. Design Combinational and Sequential circuits
3. Design amplifiers and pulse circuits
4. Analyse Logic families.

### Module I

Number system: Binary-HEX and other number systems - conversion from one radix to another - Boolean algebra – ASCII – EBCDIC – Grey Code - Excess 3 code – Code Conversion – Parity checking.

Boolean algebra and logic gates: axiomatic definition of Boolean algebra, basic theorems and properties, Boolean functions – canonical and standard forms, Logic operations– Digital logic gates.

Gate level minimization: K Map – 2,3,4,5 variable maps – POS simplification – Don't care conditions- NAND and NOR implementation- XOR function- Quine Mc Clusky Technique.

### Module II

Combinational logic: Combinational circuits – Analysis procedure – design procedure- Binary adder – Subtractor- Binary multiplier – Magnitude comparator – Decoders- Encoders-Multiplexers and demultiplexers.

Sequential circuits: Flip-flops–RS, JK, T and D flip flops – conversions–shift registers- counters - asynchronous counter– synchronous counter– up-down counter- ring counter- Johnson counter.

Logic families-TTL, RTL, ECL, CMOS- tri state logic–specification- noise consideration.

RAM, ROM, PROM, EPROM, BJT RAM CELLS – MOSRAMS.

### Module III

Synchronous sequential circuits: Analysis of clocked sequential circuits- State reduction and analysis- Design procedure.

Asynchronous Sequential circuits: Analysis procedure- Circuits with Latches- Hazards.

### Module IV

Pulse Circuits: Pulse shaping using RC circuits–differentiating, integrating circuits - clipping– clamping using diodes and transistors.

Amplification: CE amplifier–Low, Medium & high frequency analysis and design of RC coupled amplifier. FET and JFET- its characteristics, MOSFET.

### References:

1. Boylestad, R., & Nashelsky, L. (2013). Electronic devices and circuit theory (11th ed.). Pearson Prentice Hall. Upper Saddle River, N.J.
2. Mano, M. (2008). Digital logic and computer design (4th ed.). Prentice-Hall, Englewood Cliffs, N.J.
3. Kumar, A. (2004). Fundamentals of digital circuits (Eastern economy ed.). Prentice-Hall of India, New Delhi.
4. Taub, H., & Schilling, D. (1983). Digital integrated electronics (10. print., internat. student ed.). McGraw-Hill, Auckland New Zealand.
5. Millman, J., & Halkias, C. (1998). Integrated electronics: Analog and digital circuits and systems (3rd ed.). Tata McGraw-Hill, New Delhi

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation:

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## CS/IT 15-1303 DISCRETE COMPUTATIONAL STRUCTURES

### Course Objectives

1. To focus on mathematical principles central to computer science including sets, logic and proofs
2. To learn how to apply the concepts of discrete mathematics in computer science problems

### Course Outcomes:

On completion of this course the student will be able to

1. understand sets, relations, functions and discrete structures
2. apply propositional logic and first order logic to solve problems
3. understand discrete mathematical structures
4. formulate and solve graph problems
5. formulate and solve recurrence relations

### Module I

Logics and Proofs: Propositional Logic, Connectives, Propositional Equivalences, Quantifiers, Proofs: Direct-Contraposition - Contradiction - Resolution - mathematical induction, Sets, Relations: properties - Representation - Composition of Relation - Equivalence Relation, Function: Types - Composition of Function.

### Module II

Algorithms: Introduction - The Growth of Functions - Complexity of Algorithms, Recursive algorithms, counting: Basics of counting - The Pigeonhole Principle, Recurrence relations - Order of Recurrence Relation - Linear Recurrence Relation with Constant Coefficients - Linear Homogeneous Recurrence Relation with Constant Coefficients.

### Module III

Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homomorphism of graphs, Euler and Hamiltonian paths and graphs, shortest path in weighted graphs-Dijkstra's Algorithm Trees: Introduction to trees - Spanning Trees - Minimum Spanning Tree - Kruskal's Algorithm.

### Module IV

Algebraic Structures: Semigroups and Monoids, groups, subgroups, homomorphism, rings, fields. Posets, Hasse Diagrams, Lattice: Bounded Lattice - Sub lattice - Distributive Lattice - Isomorphic Lattice.

### References

1. Rosen, K. (2012). Discrete mathematics & its applications: With combinatorics and graph theory (7th ed.). McGraw-Hill.New Delhi
2. Veerarajan, T. (2007). Discrete mathematics with graph theory and combinatorics. Tata McGraw-Hill.New Delhi
3. Grimaldi, R. (1999). Discrete and combinatorial mathematics: An applied introduction (4th ed.). Addison-Wesley Longman. Reading, Mass.
4. Gupta, S. (n.d.). Discrete mathematics and structures (Sixth ed.).

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## CS/IT 15-1304 OBJECT ORIENTED PROGRAMMING

### Course Objectives

1. To understand clearly the difference between object oriented programming and procedural programming
2. To learn and apply advanced C++ features such as function overloading, operator overloading, inheritance, virtual functions etc in programs
3. To build C++ classes using appropriate encapsulation and other design principles

### Course Outcomes:

On completion of this course the student will be able to

1. Understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using C++
2. Study the principles of operator overloading, function overloading etc and to develop C++ programs.
3. Get a deep knowledge of various types of inheritances and dynamic binding.
4. Get a clear understanding of secondary storage and data retrieval.

### Module I

Procedure oriented programming-Object oriented programming paradigm – Basic concepts of object oriented programming-Benefits of OOP –console I/O operations – formatted and unformatted –managing output with manipulators. Functions in C++ -call and return by reference – inline functions - default arguments – const arguments – function overloading –friend functions.

### Module II

Classes and objects – Specifying a class – Defining member functions – Memory allocation for objects – Static data members – Static member functions – Arrays of objects – const member functions – Constructors and Destructors – Constructors- default, parameterised, with default arguments. copy constructor – destructors –operator overloading – overloading unary operators - overloading binary operators - overloading binary operators using friends – manipulation of strings using operators – Type conversions – basic to class, class to basic, class to class.

### Module III

Inheritance: Defining derived classes, Single inheritance, Multilevel inheritance, multiple inheritance, Hierarchical inheritance - Hybrid inheritance – virtual base classes – Abstract classes – Constructors in derived classes –pointers - pointers to objects - this pointer – pointers to derived classes – virtual functions – pure virtual functions .

### Module IV

Working with files – classes for fstream operations- opening and closing of file – detecting end of file – file modes – file pointers and manipulators – sequential input and output operations – random access – Templates – Exception handling – Manipulating strings

### References

1. Balagurusamy, E. (2013). Object oriented programming with C++ (6th ed.). Tata McGraw-Hill. New Delhi
2. Lafore, R., &Lafore, R. (2002). Object-oriented programming in C++ (4th ed.). SamsPub.Indianapolis, Ind.
3. Stroustrup, B. (2013). The C++ programming language (4th ed.). Reading, Mass.: Addison-Wesley.
4. Kamthane, A. (2003). Object-oriented programming with ANSI and Turbo C++. Pearson Education.Delhi, India
5. Schildt, H. (2012). C++ the complete reference (5th ed.). Osborne McGraw-Hill. Berkeley

*Note: Continuous assessment:*

*I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)*

*II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)*

*Assignments – Maximum marks: 10*

*Attendance – Maximum marks: 5*

*End semester evaluation*

*Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.*

**PART A** (10 x 2 = 20 marks)

*Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules*

**PART B** (4 x 10 = 40 marks)

*Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I*

*Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II*

*Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III*

*Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV*

## IT 15-1305 COMPUTER ORGANIZATION

### Course Objectives:

To understand the functional units of a computer and their internal organization

### Course Outcomes:

On completion of this course the student will be able to

1. Learn the about the basic functional units of a computer and its operational concepts
2. Learn the execution of a complete instruction and arithmetic operations.
3. Understanding of internal organization of memory chips and different memories (static and dynamic)
4. Analyze different interrupts, buses and I/O interface circuits

### Module I

Basic structure of computers -Functional units -Basic operational concepts -Bus structures -Instructions & instruction sequencing. Hardware and software -Addressing modes -Assembly language – Stacks & Subroutines

### Module II

Processing Unit – Fundamental concepts –Execution of a complete instruction - Hardwired control unit- microprogrammed control - control signals -microinstructions- microprogram sequencing- Branch address modification- Pre-fetching of micro instructions- Emulation.

Computer arithmetic - logic design for fast adders - multiplication - Booth' s algorithm Fast multiplication - integer division - floating point numbers and operations.

### Module III

Memory organization-Semiconductor RAM memories- internal organization of memory chips- Static and Dynamic memories -cache memories - mapping functions- replacement algorithms - virtual memory - address translations – performance considerations – interleaving - Secondary storage.

### Module IV

Input-output organizations - interrupts – Enabling & Disabling interrupts -handling multiple devices - device identification - vectored interrupts - interrupt nesting – Simultaneous requests – DMA - Buses - I/O interface circuits – Standard I/O interfaces.

Basic Concepts of Pipelining and Embedded systems.

### References:

1. Hamacher, V., & Vranesic, Z. (1990). Computer organization (3rd ed.). McGraw-Hill. New York
2. Stallings, W. (2000). Computer organization and architecture: Designing for performance (5th ed.). Prentice Hall. Upper Saddle River, N.J.
3. Tanenbaum, A. (1984). Structured computer organization (2nd ed.). Prentice-Hall. Englewood Cliffs, N.J.
4. Patterson, D., & Hennessy, J. (2011). Computer Organization and Design, Revised Fourth Edition the Hardware/Software Interface. (4th ed.). Elsevier Science.
5. Hayes, J. (1978). Computer architecture and organization. McGraw-Hill. New York

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1306 DATA COMMUNICATION & NETWORKING

### Course Objectives:

To enable seamless exchange of data between any points in the world.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn the basics of data communication and computer networks
2. Know about different types of networks
3. Learn with a solid foundation in fundamentals required to have a better understanding of the Internet.
4. Understand the working of network protocols and standards

### Module I

Introduction –Data Communications, Networks, The Internet, Protocols and Standards. Network Models- ISO/OSI Reference Model, TCP/IP Reference Model.

Physical Layer and Media:- Data and Signals- Analog and Digital, Transmission Impairments, Data Rate Limits, Performance, Digital-to-Digital Conversion, Analog-to-Digital Conversion, Digital-to- Analog Conversion, Analog-to- Analog Conversion, Bandwidth Utilization -Multiplexing, Spread Spectrum, Transmission Media –Guided and Unguided Media, Switching- Circuit-Switched Network, Datagram Network, Virtual Circuit Network.

### Module II

Data Link Layer : Error Detection And Correction-Types of Errors, Redundancy, Detection Vs Correction, Forward Error Correction Vs Retransmission, Block coding, Cyclic Codes- CRC, Polynomials, Checksum.

Data Link Control- Framing, Flow and Error Control, Protocols, Noiseless and Noisy channel, HDLC, Point-to- Point Protocols. Multiple Access- Random Access, channelization.Wired LANs- Ethernet, Wireless LANs-IEEE 802.11, Bluetooth.Connecting Devices- Virtual LANs.

### Module III

Introduction to Network Layer – Logical Addressing, Internet Protocol -IPv4, IPV6, Address Mapping, Error Reporting, Multicasting, Delivery, Forwarding and Routing, Routing Algorithms –Distance Vector Routing, Link State Routing. Unicast Routing Protocols.

### Module IV

Transport Layer: Process to Process Delivery– Port Addressing, TCP&UDP-Segment Format, TCP Connection, Congestion Control and Quality of service.

Application Layer Services: Domain Name System, Remote Logging, Electronic Mail, File transfer, WWW & HTTP, Network Management: SNMP, Dynamic Host Configuration, Peer to Peer Networks.

### References:

1. Forouzan, B., &Fegan, S. (2007). Data communications and networking (4th ed.). McGraw-Hill Higher Education. Boston
2. Kurose, J., & Ross, K. (2013). Computer networking: A top-down approach (6th ed.). Pearson. Boston
3. Tanenbaum, A., &Wetherall, D. (2011). Computer networks (5th ed.). Pearson Prentice Hall. Boston
4. Comer, D. (2009). Computer networks and internets (5th ed.). Pearson/Prentice Hall. Upper Saddle River, N.J
5. Stallings, W. (2000). Data and computer communications (6th ed.). Prentice Hall. Upper Saddle River, N.J.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV , V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI , VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII , IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV



## IT 15-13L1 & LOGIC DESIGN & ELECTRONIC CIRCUITS LABORATORY

### Course Objectives:

Understand and implement multimeters, signal generator, CRO etc, and measurement of electric quantities, characteristics of active devices, rectifying circuits and regulators and designed the circuits for low frequency regulators and integrating circuits.

### Course Outcomes:

On completion of this course the student will be able to

1. Understand the scientific and engineering fundamentals related to electronic devices and circuits.
2. Enable students as to comprehend, analyze, design electronic circuits.
3. Come across with different IC's
4. Design counters using different methods
5. Get a basic in circuit design using PCB

### A. DIGITAL

1. Transfer characteristics and specifications of TTL and MOS gate.
2. Design of half adder and Full adder using NAND gates, set up R-S & J-K flip flops using NAND gates.
3. Asynchronous UP/DOWN counter using J-K F/Fs.
4. Study of shift registers and design of Ring counter using it.
5. Study of IC counter 7490, 7492, 7493 and 74192.
6. Study of MUX IC's and DEMUX IC's (74151, 74150, 74153)
7. Design of Johnson Counter

### B. ANALOG

8. Study of Multimeters, Signal Generators, CRO etc and measurement of electrical quantities.
9. Testing of active and passive components – Resistors, Capacitors, Inductors, Transformers, Diodes, and Transistors etc.
10. Characteristics of active devices:
11. Forward and reversed characteristics of a diode measurement of forward resistance.
12. Common base characteristics of a transistor – measurements of current gain, input resistance and output resistance, maximum ratings of the transistor.
13. Common emitter characteristics of a transistor – measurement of current gain, input resistance and output resistance, relation between and study of the effect of leakage current, maximum ratings of the transistor.
14. Rectifying circuits: FW Rectifier – HW Rectifier – FW Bridge Rectifier Filter circuits – capacitor filter , inductor filter and FT section filter (Measurement of ripple factor maximum ratings of the devices)
15. Study of RC and RLC circuits – Frequency response, pulse response, Filter Characteristics, Differentiating circuit and integrating circuit.
16. Clipping and clamping circuits using diodes/transistors

### C. Circuit design using PCB

17. Familiarization

### References:

1. Boylestad, R., & Nashelsky, L. (2013). Electronic devices and circuit theory (11th ed.). Pearson Prentice Hall. Upper Saddle River, N.J.
2. Mano, M. (2008). Digital logic and computer design (4th ed.). Prentice-Hall, Englewood Cliffs, N.J.
3. Kumar, A. (2004). Fundamentals of digital circuits (Eastern economy ed.). Prentice-Hall of India, New Delhi.

### Note:

1. Continuous assessment: 25 marks

For continuous assessment, the marks may be awarded on the basis of the performance of the student in the laboratory sessions. Marks for continuous assessment of laboratory courses shall be:

a) Practical records/Outputs: 10 marks

b) Regular Lab work: 10 marks

c) Test: 5 marks

2. End semester assessment: 25 marks.

The end semester assessment will consist of an examination and a viva voce.

A candidate shall secure a minimum of 50% marks in the aggregate and 45% minimum in the end semester examination for a pass.

## CS/IT 15-13L2 OBJECT ORIENTED PROGRAMMING LABORATORY

### Course Objectives

1. To differentiate the programming techniques of structured and OOPS programming
2. To familiarize with the implementation of various OOPS concepts in C++

### Course Outcomes:

On completion of this course the student will be able to

1. Implement concepts like function overloading, operator overloading etc.
2. implement different types of inheritance structures
3. implement virtual functions and dynamic programming
4. implement file processing

### A: Programming in Object oriented environment. Implement the following using C++

1. Programs to differentiate between struct and class
2. Programs to implement data abstraction, data encapsulation and information hiding
3. Programs to implement different Inheritance structures - Single, multiple, multilevel, hierarchical
4. Programs to implement Operator overloading and function overloading
5. Programs to implement virtual functions and dynamic binding.
6. Programs to implement Pointers and arrays
7. Programs to implement Files

### References

1. Balagurusamy, E. (2013). Object oriented programming with C++ (6th ed.). Tata McGraw-Hill. New Delhi
2. Lafore, R., & Lafore, R. (2002). Object-oriented programming in C++ (4th ed.). SamsPub. Indianapolis, Ind.
3. Stroustrup, B. (2013). The C++ programming language (4th ed.). Reading, Mass.: Addison-Wesley.
4. Kamthane, A. (2003). Object-oriented programming with ANSI and Turbo C++. Pearson Education. Delhi, India
5. Schildt, H. (2012). C++ the complete reference (5th ed.). Osborne McGraw-Hill. Berkeley

### Note:

#### 1. Continuous assessment: 25 marks

For continuous assessment, the marks may be awarded on the basis of the performance of the student in the laboratory sessions. Marks for continuous assessment of laboratory courses shall be:

- a) Practical records/Outputs: 10 marks
- b) Regular Lab work: 10 marks
- c) Test: 5 marks

#### 2. End semester assessment: 25 marks.

The end semester assessment will consist of an examination and a viva voce.

A candidate shall secure a minimum of 50% marks in the aggregate and 45% minimum in the end semester examination for a pass.

## AS 15-1401 COMPLEX VARIABLES AND PARTIAL DIFFERENTIAL EQUATIONS

### Course Objectives:

To understand and use complex variables, function integrals, partial differential equation in Engineering discipline.

### Course Outcomes:

On completion of this course the student will be able to

1. Transform a region to another region using conformal mapping.
2. Evaluate real integrals using residue theorem.
3. Formation and solution of partial differential equation.
4. Determine solution of partial differential equation for vibrating string and heat conduction

### Module I

Analytic function- Cauchy-Riemann equation (Cartesian and polar)-Harmonic function- construction of analytic function given real or imaginary parts- Conformal mapping of standard elementary function and bilinear transformation.

### Module II

Cauchy's integral theorem, Cauchy's integral formula and for derivatives-Taylor's and Laurent's expansion (without proof)-Singularities-Residues-Cauchy's Residues theorem- Contour integration involving unit circle.

### Module III

Formation of partial differential equation eliminating arbitrary constants and function—Solution of first order equation- four standard types- Lagrange's equation—Linear homogeneous partial differential equation with constant coefficient.

### Module IV

One dimensional wave equation, D'Alembert's solution and one dimensional heat flow equation—solution by the method of separation of variables- application of Fourier series solution. Solution of Laplace's equation over a rectangular region by the method of separation of variables

### References:

1. Kreyszig, E. (2011). Advanced engineering mathematics (10th ed.). John Wiley, New York
2. Grewal, B.S, & Grewal, J.S (2013). Higher engineering mathematics (43rd ed.). Khanna, Delhi.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV , V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI , VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII , IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1402 FORMAL LANGUAGES, AUTOMATA AND COMPUTATION

### Course Objectives:

Introduce the concepts Automata theory, theory of computation and formal language classes and their relationships.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn the concepts in automata theory and formal languages.
2. Learn the closure properties and pumping lemmas of formal languages and automata.
3. Acquire a fundamental concepts regarding decidable and undecidable problems.
4. Learn the relationship between different formal languages.

### Module I

Finite Automata and Regular Expression: NFA ,DFA, Equivalence of NFA and DFA, Equivalence of NFA and NFA with epsilon moves, regular expression, Equivalence of regular expression and finite automata, Finite automata with output , Equivalence of finite automata with output (Moore and Mealy Machines), Equivalence of Moore and Mealy machines ,Applications of Finite automata.

Properties of Regular sets: Pumping Lemma, closure properties, My Hill Nerode theorem

### Module II

Context Free Grammars and languages: Definitions, Derivations parse Trees, Ambiguity, Simplification of CFG, Normal forms of CFG - Chomsky Normal form, Greibach Normal Form.

Push Down Automata: Definition of PDA & DPDA, Languages of PDA, Equivalence of PDA and CFL, Applications of CFG, pumping lemma for CFL, Closure Properties, and Decision algorithms.

### Module III

Turing machine: TM model, Computational Languages and Functions, Techniques for construction of TM, NDTM.

Undecidability: Decidable & undecidable problems, properties of recursive and recursively enumerable languages, UniversalTM and an undecidable problem

### Module IV

Chomsky Hierarchy : Regular Grammars, equivalence of regular grammar and FA , Unrestricted Grammars, equivalence of unrestricted grammar and TM , Context Sensitive Languages (CSL) and Linear Bounded Automaton(LBA), Equivalence of LBA and CSL, Relation between languages.

### References:

1. Hopcroft, J., & Ullman, J. (1979). Introduction to automata theory, languages, and computation. Addison-Wesley. Reading, Mass.
2. Martin, J. (2011) Introduction to languages and the theory of computation (3rd ed.). McGraw-Hill. New York
3. Mishra KLP,&Chandrasekaran N. (2006). Theory of Computer Science: Automata, Languages and Computation. (3rd ed.). PHI Learning.
4. Lewis, H., & Papadimitriou, C. (1981). Elements of the theory of computation. Prentice-Hall. Englewood Cliffs, N.J.
5. Sipser, M. (2013). Introduction to the theory of computation (3rd ed.).Course Technology Cengage Learning. Australia

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1403 SYSTEM PROGRAMMING

### Course Objectives:

To understand assemblers, linkers, loaders, macro processors and operating systems.

### Course Outcomes:

On completion of this course the student will be able to

1. Design an assembler – two pass and one pass
2. Design a macro processor and loaders
3. Explain the basic functions of an operating system.
4. Know about different operating systems.

### Module I

Introduction to System Software - Assemblers: Overview of the assembly process - Machine dependent assembler features-Machine independent assembler features-Design of two pass assembler-single pass assembler.

### Module II

Loaders and linkers –Basic Loader functions-Machine Dependent Loader Features-Machine Independent Loader Features-Loader Design Options

### Module III

Macro Processors-Basic Macro Processor Functions-Machine Independent Macro Processor Features-Macro Processor Design Options

### Module IV

Operating Systems – Basic Operating Systems functions – Types of Operating Systems –User Interface – Run-time Environment. Operating Systems Design Options – Hierarchical Structures – Virtual Machines – Multiprocessor Operating Systems – Distributed Operating Systems – Object Oriented Operating Systems.

### References

1. Beck. (1997) System Software: An Introduction To Systems Programming. (3rd edn.). Pearson Education India.
2. Dhamdhare, D. (1999). Systems programming and operating systems (2nd rev. ed.). Tata McGraw-Hill. New Delhi
3. Donovan, J. (2001). Systems programming. Tata McGraw-Hill Education.
4. Pal, S. (2011). Systems programming. Oxford University Press. New Delhi

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1404 MICROPROCESSOR AND MICROCONTROLLER ARCHITECTURE

### Objectives:

1. To understand the basic principles of a Microprocessor based System
2. To understand the Intel 8086 microprocessor architecture and its programming
3. To Study the different Interfacing chips and devices
4. To introduce the concept of 8051 micro controller and its programming

### Course Outcomes:

On completion of this course the student will be able to

1. Describe the terms related to a microprocessor based system
2. Explain the 8086 microprocessor architecture
3. Program the 8086 microprocessor with interfacing devices
4. Describe the features of 8051 microcontroller and its program

### Module I

Introduction to Computer System – Computer and its Organization, Programming System, Microprocessors, Buses, Tristate Bus, Clock Generation, I/O Interfacing, Data Transfer Schemes, Architectural Advancements of Microprocessors, Evolution of Microprocessors.

Intel 8086 Hardware Architecture- Architecture, Pin Description, External Memory Addressing, Bus Cycles, 8086 system configuration, Interrupt Processing, Direct Memory Access.

### Module II

Programmer's Model of 8086, Operand Types, Addressing Modes, Assembler Directives, Instruction Set – Data Transfer, Arithmetic, Logical, Control Transfer, Miscellaneous. Programming Exercises.

### Module III

Peripheral Interfacing – Generation of I/O ports, Programmable Peripheral Interface 8255, Sample -and -Hold Circuit and Multiplexer, Keyboard and Display Interface, Keyboard and Display controller 8279, Programmable Interval Timers 8253 and 8254, DAC and ADC , CRT & Printer Terminal Interface.

### Module IV

8051 Microcontroller – Hardware Architecture – Memory Organisation, Pins and Signals, timing and control, Port Operation, Interfacing, Interrupts.

8051 Instruction Set and Programming. 8051 based System Design Case Studies.

### References:

1. KrishnaKant. (2007). Microprocessors and microcontrollers - architecture: Programming and system design 8085, 8086, 8051, 8096. India: Prentice Hall.
2. Brey, B. (2009). The Intel microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro processor, Pentium II, Pentium III, and Pentium 4 : Architecture, programming, and interfacing (8th ed.). Prentice Hall. Upper Saddle River, N.J.
3. Antonakos, J. (2007). The Intel microprocessor family: Hardware and software principles and applications. Clifton Park, NY: Thomson Delmar Learning.
4. Rafiquzzaman, M. (1990). Microprocessors and microcomputer-based system design. CRC Press. Boca Raton, Fla.
5. Hall, D. (1986). Microprocessors and interfacing: Programming and hardware. Gregg Division, McGraw-Hill. New York

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## CS/IT 15-1405 DATA STRUCTURES AND ALGORITHMS

### Course Objectives

1. To identify, understand and determine the usage of various data structures, their design, operations and associated algorithms
2. To study the basic algorithm techniques for various types of sorting and searching

### Course Outcomes:

On completion of this course the student will be able to

1. Master the implementation of linked data structures such as linked lists and binary trees
2. Familiarize with advanced data structures such as balanced search trees, hash tables, spatial data structures etc.
3. Familiarize with several sorting algorithms including quicksort, merge sort and heapsort
4. familiarize with some graph algorithms such as shortest path and minimum spanning tree

### Module I

Introduction to Data structures - Arrays & sparse matrices – representation, Searching - linear, binary – Sorting – selection, bubble, insertion, quick, merge, heap- Hash tables – Hashing functions -Associative arrays

### Module II

Linked lists – singly, doubly and circular lists, Application of linked lists – Polynomial manipulation, Stacks – Implementation of stacks using arrays and lists – Typical problems – Conversion of infix to postfix – Evaluation of postfix expression . Queues and Deques – implementation, priority queues

### Module III

Trees, Definition and mathematical properties. Representation – sequential, lists - Binary trees – Binary tree traversals – pre-order, in-order & post-order, Expression trees. Threaded binary trees.Binary Search trees.AVL trees-tries - Spatial data structures- k-d tree.

### Module IV

Graphs – Graph representation using adjacency matrices and lists – Graph traversals – DFS, BFS - shortest path – Dijkstra's algorithm, Minimum spanning tree – Kruskal Algorithm, Prims algorithm – Tree based indexing, B trees and B+ trees.

### References

1. Lafore, R., &Lafore, R. (2003). Data structures & algorithms in Java (2nd ed.). Sams. Indianapolis, Ind.
2. Drozdek, A. (2001). Data structures and algorithms in Java. Brooks/Cole Pub. Pacific Grove, CA
3. Sahni, S. (2000). Data structures, algorithms, and applications in Java. Boston: McGraw-Hill.
4. Langsam, Y., &Augenstein, M., & Tanenbaum A (2003). Data structures using Java. Pearson Prentice Hall. Upper Saddle River, N.J.
5. Shaffer, C. (2011). Data structures & algorithm analysis in Java (3rd ed., Dover ed.). Dover Publications. Mineola, NY

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV



## CS/IT 15-1406 DATABASE MANAGEMENT SYSTEMS

### Course Objectives

1. To understand different database models, query language, effective manipulation of memory space for database files
2. To understand the normalization and to protect the data and the database from unauthorized access and manipulation

### Course Outcomes:

On completion of this course the student will be able to

1. define the terminology, features, classifications, and characteristics embodied in database systems
2. analyze an information storage problem and derive an information model expressed in the form of entity relation diagram and other optional analysis forms, such as a data dictionary
3. demonstrate an understanding of the relational data model
4. transform an information model into a relational database schema and use a data definition language and/or utilities to implement the schema using a DBMS
5. formulate solutions to a broad range of query problems using relational algebra
6. formulate solutions to a broad range of query and data update problems using SQL
7. demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database
8. use an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database
9. use a desktop database package to create, populate, maintain, and query a database

### Module I

Introduction: Characteristics of the Database approach – Data models, schemas and instances – DBMS architecture – Data independence – Database languages and interfaces – Database administrator – Data modeling using Entity - Relationship (ER), Entity sets, attributes and keys - Relationships, Relationship types, roles and structural constraints - Weak Entity types - Enhanced Entity-Relationship (EER) and object modeling. Sub classes, super classes and inheritance - Specialization and generalization.

### Module II

Record storage and file organizations: Placing file records on disks – Fixed length and variable length records- Spanned Vs Unspanned records - Heap files, Sorted files. Hashing Techniques-Internal, External. Indexed structures for files – single level ordered index, multi- level indexes.

### Module III

The Relational model: Concepts-Relational model constraints – The Relational Algebra. Functional Dependencies – Basic definition – Trivial and Nontrivial dependencies – First, Second and Third normal forms – Boyce-Codd normal form. SQL – Commands – Group By & Order By – Cursor – Procedure & Function – Trigger – View-Introduction to SQL variants- PL/SQL, XML query language-Introduction to query optimization.

### Module IV

Transaction Management- Concurrency Control-Lost Updates- Uncommitted Data-Inconsistent Retrievals- The Scheduler-Concurrency Control with Locking Methods –Concurrency Control with Time Stamping- Concurrency Control with Optimistic Methods- Database Recovery Management. Introduction to object oriented databases, Active databases.

### References

1. Elmasri, R. (2013). Fundamentals of Database Systems: Pearson New International Edition (6th ed., international ed.). Pearson. Harlow
2. Coronel, C., & Morris, S. (2011). Database systems: Design, implementation, and management (9th ed.). Course Technology Cengage Learning. Australia
3. Silberschatz, A., & Korth, H. (2011). Database system concepts (6th ed.). McGraw-Hill. New York
4. Connolly, T., & Beg, C. Database systems: A practical approach to design, implementation, and management (Sixth ed.).
5. Date, C., & Kannan, A. (2006). An introduction to database systems (8th ed.). Dorling Kindersley. Noida
6. Dunham, M. (2003). Data mining introductory and advanced topics. Prentice Hall/Pearson Education. Upper Saddle River, N.J.
7. Molina, H., & Ullman, J. (2014). Database systems the complete book : Pearson new international edition (Second ed.). Pearson Education Limited. Essex

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10, Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV



## IT 15-14L1 PC HARDWARE & MICROPROCESSOR LAB

### Course Objectives:

1. Familiarization of PC components
2. Able to understand microprocessor trainer kit, able to interface 8086 microprocessor with various peripherals like 8255 and 8279, able to interface 8086 microprocessor with various peripherals
3. Write assembly language programs for various problems like Arithmetic Logic programme, Waveform generation, Stepper motor control
4. Discuss the operation of various interfacing devices like 8279, 8255 etc, discuss about Interface

### Course Outcomes:

On completion of this course the student will be able to

1. Learn the basic components of PC.
2. Familiarizes to Troubleshooting, Maintenance and Assembling a PC.
3. Learn the fundamentals of assembly level programming using 8086 microprocessors
4. Study the standard microprocessor interfaces.

### A: PC HARDWARE

1. Study of SMPS, TTL and composite type monitor circuits, Emulator, Logic state analyser, Serial port, Parallel port, Motherboard, CGA card, Floppy disk controller, Hard disk controller, Printer Interface, Keyboard Interface
2. Hard Disk drive: Partitioning, Familiarisation of disk maintenance, Software Tools. Installations.
3. Troubleshooting and maintenance: Preventive and maintenance, Common maintenance problems
4. Familiarisation: Device drivers, Motherboard components and other add on cards.
5. Assembling a PC

### B: MICROPROCESSOR

6. Study of typical microprocessor trainer kit
7. Simple Programming examples using 8086 instruction set to understand the use of various instructions and addressing modes – Monitor routines – at least 20 examples
8. Programming examples to initialise 8251 and to understand its I/O operations
9. Programming examples to initialise 8255 and to understand its I/O operations
10. Programming examples to initialise 8279 and to understand its I/O operations
11. A/D and D/A counter Interface
12. Interface and programming of 8255 (e.g. Traffic light control, burglar alarm, stop water)

### References:

1. Bhurchandi, K., & Ray, A. (2013). Advanced microprocessors and peripherals (3rd ed.). Tata McGraw Hill Education Private. New Delhi

### Note:

#### 1. Continuous assessment: 25 marks

For continuous assessment, the marks may be awarded on the basis of the performance of the student in the laboratory sessions. Marks for continuous assessment of laboratory courses shall be:

- a) Practical records/Outputs: 10 marks
- b) Regular Lab work: 10 marks
- c) Test: 5 marks

#### 2. End semester assessment: 25 marks. The end semester assessment will consist of an examination and a viva voce.

A candidate shall secure a minimum of 50% marks in the aggregate and 45% minimum in the end semester examination for a pass.

## CS/IT 15-14L2 DATA STRUCTURES LABORATORY

### Course Objectives

1. To design and apply appropriate data structure using simple algorithms for modeling and solving computing problems

### Course Outcomes:

On completion of this course the student will be able to

1. Understand and implement both array based and linked-list based data structures, including singly and doubly linked-lists.
2. Understand and implement the stack data structure and stack operations
3. Understand and implement general tree data structures, including binary tree, priority queue and circular queue.
4. Understand and implement graph data structures and various sorting techniques.

### A: Programming in Object oriented environment. Implement the following using Java.

1. Simple programming exercises
2. Searching and Sorting
3. Linked Lists- Singly and doubly
4. Stacks – various applications
5. Queues-Linear and circular
6. Trees –Binary search tree and threaded binary trees
7. Graphs- Traversals ,Minimum spanning trees

### References

1. Lafore, R., &Lafore, R. (2003). Data structures & algorithms in Java (2nd ed.). Sams. Indianapolis, Ind.
2. Drozdek, A. (2001). Data structures and algorithms in Java. Brooks/Cole Pub. Pacific Grove, CA
3. Sahni, S. (2000). Data structures, algorithms, and applications in Java. Boston: McGraw-Hill.
4. Langsam, Y., &Augenstein, M., & Tanenbaum A (2003). Data structures using Java. Pearson Prentice Hall. Upper Saddle River, N.J.
5. Shaffer, C. (2011). Data structures & algorithm analysis in Java (3rd ed., Dover ed.). Dover Publications. Mineola, NY

### Note:

#### 1. Continuous assessment: 25 marks

For continuous assessment, the marks may be awarded on the basis of the performance of the student in the laboratory sessions. Marks for continuous assessment of laboratory courses shall be:

- a) Practical records/Outputs: 10 marks
- b) Regular Lab work: 10 marks
- c) Test: 5 marks

#### 2. End semester assessment: 25 marks. The end semester assessment will consist of an examination and a viva voce.

A candidate shall secure a minimum of 50% marks in the aggregate and 45% minimum in the end semester examination for a pass.

## IT 15 -1501 NUMERICAL AND STATISTICAL METHODS.

### Course Objectives:

To understand the concept of probability, statistics and numerical methods which arise in engineering application.

### Course Outcomes:

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

1. Solve algebraic and transcendental equations by numerical methods
2. Perform numerical differentiation and integration
3. Find the mean and variance of a probability distribution including the binomial distribution.
4. Use statistical tests in testing hypotheses on data

### Module I

Numerical solution of algebraic and transcendental equation by -Regula-falsi method, Newton Raphson's method. Gauss Seidal iteration method to solve a system of equations and convergence (without proof) Newton's forward and backward interpolation formula .Lagrange interpolation, Newton's divided difference and central differences

### Module II

Numerical differentiation at the tabulated points with forward, backward and central differences. Numerical integration with trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule. Taylor series method. Euler method, Modified Euler method, Runge –Kutta method of second and fourth order for solving 1st order ordinary differential equation.

### Module III

Random variable (discrete and continuous) Expectation-mean and variance of probability distribution. Binomial, Poisson and Normal distribution and Fitting of this Distribution to the given data. Curve fitting-fitting of straight line, parabola, exponential.

### Module IV

Population and Sample-Sampling Distribution (of mean and variance) Testing of Hypothesis-level of significance, Ztest statistic, Chi square test for variance, for goodness of fit and F-test

### References:

1. Kreyszig, E. (2011). Advanced engineering mathematics (10th ed.). John Wiley, New York
2. Grewal, B.S, & Grewal, J.S (2013). Higher engineering mathematics (43rd ed.). Khanna, Delhi.
3. Kandasamy, P., &Thilagavathy, K. (2003). Numerical methods. New Delhi: S. Chand & Company.
4. Johnson, R., & Miller, I. (2014). Miller and Freund's probability and statistics for engineers (8th ed., Pearson new international ed.). Pearson.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## CS/IT 15-1502 OPERATING SYSTEMS

### Course Objectives

1. To study the basic concepts, structure and functions of operating systems.
2. To learn about processes, threads and scheduling algorithms
3. To understand the principles of concurrency and deadlocks
4. To learn various memory management schemes, I/O management and file systems.
5. To give an overview about Real time operating systems.

### Course Outcomes:

On completion of this course the student will be able to

1. Design various scheduling algorithms
2. Apply the principles of concurrency
3. Design deadlock, prevention and avoidance algorithms
4. Compare and contrast various memory management schemes
5. Design and Implement a prototype file system
6. Attain basic knowledge about Real time operating systems

### Module I

Introduction to Operating Systems: Operating system concepts – System calls – Operating System Structure. Processes - Process Concept - Process Scheduling – Inter-process Communication – Process Synchronization - Race Conditions - Critical Sections – Mutual Exclusion - Busy Waiting - Sleep And Wakeup -Semaphores. CPU Scheduling - Scheduling Criteria - Scheduling Algorithms - First come First Served - Shortest Job First - Priority scheduling - Round Robin Scheduling - Multiple queues scheduling – Guaranteed scheduling - Two- level scheduling.

### Module II

Memory management. Multiprogramming and memory usage - Swapping - multiprogramming with fixed and variable partitions - Memory management with bitmaps, linked lists, Buddy system - Allocation of swap space. Virtual memory - paging and page tables, Associative memory - Inverted page tables. Page replacement algorithms – Segmentation.

### Module III

Deadlocks - Conditions for deadlock. Deadlock Characterization - Methods for handling deadlocks - Deadlock prevention - Deadlock avoidance - resource trajectories - safe and unsafe states – Banker's algorithms. Deadlock detection and recovery - Two phase locking – Non-resource deadlocks - Starvation.

### Module IV

File systems and Input/output. Files - Directories - File system implementation - Directory Implementation - Security and Protection mechanisms.Principles of I/O hardware - I/O devices - Device controllers - DMA.Principles of I/O software - Interrupt handlers - Device drivers - Disk scheduling - Clocks and terminals.I/O Buffering - RAID- Disk Cache. Real time Operating Systems - Introduction - Types of RTOS - Characteristics - Functions - Applications of Real Time Systems – Scheduling in RTOS - Resource allocation in RTOS - Other issues in RTOS. Case Study: UNIX / LINUX operating system.

### References

1. Silberschatz, A., & Galvin, P. (2012). Operating system concepts (9th ed.). John Wiley and Sons.
2. Tanenbaum, A. (2014). Modern operating systems (4th ed.). Pearson Education.
3. Stallings, W. (2014). Operating systems: Internals and design principles (8th ed.). Pearson Education.
4. Dhamdhare, D. (2012). Operating systems: A concept-based approach (3rd ed.). New Delhi: Tata McGraw-Hill Pub.
5. Mall, R. (2008). Real-time systems theory and practice. New Delhi, India: Dorling Kindersley.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1503 KNOWLEDGE ENGINEERING

### Course Objectives:

1. Understand Problem spaces, search spaces and Production systems.
2. Understand how to represent knowledge and methods of learning in an artificial intelligent system.

### Course Outcomes:

On completion of this course the student will be able to

1. To provide students basics of Knowledge representation techniques
2. Learn the problem solving strategies which are common to AI applications.
3. Acquire different learning methods
4. Acquire the basics of Neural Networks

### Module I

Problems and Search: Define Artificial Intelligence and AI Problems, Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the design of search programs.

Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-First Search: OR Graphs, A\* algorithm. Problem Reduction: AND-OR Graphs, AO\* algorithm, Means-Ends Analysis.

Game Playing: Minimax search procedure, Alpha-beta cutoffs.

### Module II

Knowledge Representation using Logic: Propositional and Predicate Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution: Conversion to Clause Form, Resolution in Propositional Logic, Unification Algorithm, Resolution in Predicate Logic. Representing Knowledge Using Rules: Procedural versus Declarative knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, and Control Knowledge.

### Module III

Symbolic Reasoning under Uncertainty: Introduction to Nonmonotonic Reasoning, Logics for Non-monotonic Reasoning, Implementation Issues, Augmenting a Problem solver, Implementation: Depth-First Search & Breadth First Search. Statistical Reasoning:- Probability and Baye's Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic. Weak Slot-and-Filler Structures:- Semantic Nets, Frames.

Strong Slot-and Filler Structures: Conceptual Dependency, Scripts, CYC.

### Module IV

Learning: Need of learning, Rote learning, Learning by Taking Advice, Learning in Problem-solving, Learning from example: induction, Explanation-based learning

Connectionist Models: Learning in Neural Networks, Perceptrons, Backpropagation Network, Applications of Neural Networks.

### References:

1. Rich, E., & Knight, K. (2008). Artificial Intelligence (3rd ed.). Tata McGraw Hill India.
2. Patterson, D. (1990). Introduction to artificial intelligence and expert systems. Prentice Hall. Englewood Cliffs, N.J.
3. Konar, A. (2000). Artificial intelligence and soft computing: Behavioral and cognitive modeling of the human brain. CRC Press. Boca Raton, Fla.
4. Akerkar, R. (2005). Introduction to artificial intelligence (Eastern Economy ed.). Prentice-Hall of India Private. New Delhi
5. Chaitanya, V., Sangal, R., & Bharati, A. (1996). Natural language processing: A Paninian perspective (Eastern economy ed.). Prentice-Hall of India. New Delhi

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1504 DESIGN AND ANALYSIS OF ALGORITHMS

### Course Objectives:

To make students realize the importance of algorithm optimization in programming.

### Course Outcomes:

On completion of this course the student will be able to

1. Analyze algorithms and problems.
2. Learn Divide-and-Conquer paradigm, Dynamic Programming paradigm, Greedy paradigm & Backtracking paradigm. Explain when an algorithmic design situation calls for them.
3. Explain different searching and sorting methods, graph and graph traversals and their analysis.
4. Knowledge on Complexity Theory

### Module I

Analyzing Algorithms and problems. Classifying functions by their asymptotic growth rate. Recursive procedures. Recurrence equations - Substitution Method, Changing variables, Recursion Tree, Master Theorem. Design Techniques- Divide and Conquer, Dynamic Programming, Greedy, Backtracking

### Module II

Analysis of searching and sorting. Insertion sort, Quick sort, Merge sort and Heap sort. Binomial Heaps and Fibonacci Heaps, Lower bounds for sorting by comparison of keys. Comparison of sorting algorithms. Amortized Time Analysis. Red-Black Trees – Insertion & Deletion.

### Module III

Graphs and graph traversals. Strongly connected components of a Directed graph. Biconnected components of an undirected graph. Transitive closure of a Binary relation. Warshall's algorithm for Transitive closure. All pair shortest path in graphs. Dynamic programming. Constructing optimal binary search trees.

### Module IV

Complexity Theory - Introduction. P and NP. NP-Complete problems. Approximation algorithms. Bin packing, Graph coloring. Traveling salesperson Problem.

### References:

1. Cormen, T., & Leiserson, C. (2009). Introduction to algorithms (3rd ed.). Mit Press. Cambridge (Inglaterra)
2. Levitin, A. (2013). Introduction to the design & analysis of algorithms (3rd ed.). Pearson. Boston
3. Aho, A., & Hopcroft, J. (1974). The design and analysis of computer algorithms. Reading, Mass.: Addison-Wesley Pub.
4. Horowitz, E. (1984). Fundamentals of Programming Languages (Second ed.). Springer Berlin Heidelberg. Berlin, Heidelberg
5. Kingston, J. (1990). Algorithms and data structures: Design, correctness, analysis. Addison-Wesley Pub. Sydney
6. Baase, S., & Gelder, A. (2009). Computer algorithms: Introduction to design and analysis (3rd ed.). Pearson Education. Delhi
7. Knuth, D. (1998). The art of computer programming, Volume 3, Sorting and searching (Second ed.). Addison-Wesley. Upper Saddle River, NJ

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1505 SOFTWARE ENGINEERING

### Course Objectives:

Students get the knowledge on engineering aspects of developing software including software life cycles, requirement analysis, structured design, software quality and estimation.

### Course Outcomes:

On completion of this course the student will be able to

1. learn engineering aspects required for building software in a systematic way.
2. Formally specify the requirements and choose an appropriate life cycle model.
3. Get the knowledge in software quality management.
4. Acquire a basic knowledge in software project management and using case tools.

### Module I

Software Life Cycle - Waterfall model – Prototyping – Spiral model – pros and cons of each model.  
Requirements Analysis - SRS – DFD – ER Diagrams – Decision tables – Decision Trees – Formal specification techniques:  
Axiomatic and Algebraic specifications - Petri Nets

### Module II

Software Design: Design Heuristics – Cohesion and Coupling  
Design Methodologies - Structured analysis and design, Architectural Design, Interface design, Component Level design.  
Software Reuse and Software Maintenance issues.

### Module III

Introduction to Software Quality Management - Software Testing - Objectives of testing – Functional and Structural testing – Generation of test data - Test Plan - Unit testing – Integration testing – System testing – Test reporting.  
Overview of SQA Planning – Reviews and Audits – Software configuration management - Quality Standards - Study of ISO9000 & CMM

### Module IV

Software Project Management - Brief study of various phases of Project Management – Planning – Organizing – Staffing – Directing and Controlling  
Software Project Cost Estimation – COCOMO model – Software Project Scheduling  
CASE tools: CASE definitions – CASE Classifications – Analysis and Design Workbenches, Testing Workbenches

### References:

1. Mall, R. (2014). Fundamentals of software engineering. Prentice-Hall Of India.
2. Pressman, R. (2014). Software engineering: A practitioner's approach (8th ed.). McGraw-Hill Education.
3. Jalote, P. (2008). A concise introduction to software engineering. Springer. London
4. Limaye, M. (2011). Software quality assurance. Tata McGraw-Hill Education. New Delhi
5. Limaye, M. (2009). Software testing: Principles, techniques and tools. New Delhi: Tata McGraw-Hill Education Private.
6. Mathur, A. (2008). Foundations of software testing fundamental algorithms and techniques : An undergraduate and graduate text, a reference for the practicing software engineer. Delhi: Pearson Education.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV



## IT 15-1506 INTERNET PROGRAMMING

### Course Objectives:

Get familiar with web programming, client and server side scripting.

### Course Outcomes:

On completion of this course the student will be able to

1. Acquire basics of Internet programming.
2. Acquire a solid foundation in fundamentals required to create and manage websites, blogs etc.
3. Learn Database driven web application
4. Learn Ruby introduction.

### Module I

Fundamentals of Web: Internet, WWW, W3C, Web Browsers and Web Servers, Web 2.0

HTML 5: Basic syntax, Standard document structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms, Frames.

### Module II

Javascript: Overview of Javascript, Screen output and keyboard input, Input with Dialogs, Memory concepts, operators, decision making, control statements, counter controlled repetition, Arrays, Functions, objects, events.

Document Object Model (DOM): DOM nodes and trees, DOM tree, DOM Collections, dynamic styles.

### Module III

XML: Structuring data, XML namespaces, DTD, XML Schema

PHP: PHP basics, string processing, regular expressions, form processing and business logic, connecting to database, using cookies, dynamic content

### Module IV

Ruby on Rails: Ruby introduction, Rails framework, Database driven web application

### References:

1. Deitel, H., & Deitel, P. (2014). Internet and World Wide Web: How to program (5th ed.). Pearson Education.
2. Duckett, J. (2011). HTML & CSS: Design and build websites. Wiley. Indianapolis, IN
3. Sebesta, R. (2005). Programming the World Wide Web (3rd ed.). Pearson/Addison-Wesley. Boston
4. Bates, C. (2006). Web programming: Building Internet applications (3rd ed.). Wiley. Chichester, England
5. Bai, X. (2003). The web warrior guide to Web programming. Thomson/Course Technology. Australia

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV



## IT 15-15L1 OPERATING SYSTEM & NETWORK PROGRAMMING LAB

### Course Objectives:

1. Understand of inter process communication, shared memory, message passing, semaphores.
2. Understand the operating system as a resource manager.
3. Understand benefits of computer networking, establishment of IP addressing for network clients, function and configuration of TCP/IP protocols and name resolution and the difference on different remote access methods

### Course Outcomes:

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

1. Have a basic knowledge in UNIX/LINUX shell scripts and execute various shell programs.
2. Analyze and evaluate different process scheduling techniques.
3. Develop Port programming, Routing algorithms.
4. Handle common network troubleshooting techniques.

### Part A: OS Lab

1. UNIX programming
2. Shell Scripting
3. System commands like fork, join ,pipe, getpid()etc
4. File attributes using stat system call
5. IPC using shared memory, semaphores and message queues.
6. UNIX command simulation eg. ls, mvetc
7. Operating System programming
8. Process Scheduling – FCFS, SJF, Priority etc
9. Memory Management Schemes – MVT and MFT
10. Deadlock – Detection and Avoidance
11. File Management

### Part B: Computer Network Lab

12. Familiarisation/Introduction to:
  - (a) Network components such as Modem, Gateways, Routers, Switches, Cables etc.
  - (b) Various network softwares, services and applications.
  - (c) Network trouble shooting Techniques.
13. Serial Port Programming
14. Parallel Port Programming
15. TCP socket Programming
16. UDP socket Programming
17. TCP Chatting
18. UDP Chatting
19. Implementation of Routing Algorithms
20. RPC Programming

### Note:

1. Continuous assessment: 25 marks

For continuous assessment, the marks may be awarded on the basis of the performance of the student in the laboratory sessions. Marks for continuous assessment of laboratory courses shall be:

- a) Practical records/Outputs: 10 marks
- b) Regular Lab work: 10 marks
- c) Test: 5 marks

2. End semester assessment: 25 marks. The end semester assessment will consist of an examination and a viva voce.

A candidate shall secure a minimum of 50% marks in the aggregate and 45% minimum in the end semester examination for a pass.

## IT 15-15L2 MINI PROJECT – RDBMS BASED

### Course Objectives:

Students are able to design and implement database projects using software like MySQL, PostgreSQL.

### Course Outcomes:

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

1. Design & Implement Database Systems.
2. Analyze query processing and optimization
3. Apply normalization theory
4. Acquire various transaction processing, concurrency control mechanisms and database protection mechanisms.

### Project Description

It is required to design and develop a RDBMS prototype that implements the concepts and basic functionalities of a typical RDBMS. The RDBMS will have capabilities of creating schemas and tables, inserting and manipulating data, and conducting queries. A basic web-application/desktop application will be created with your DBMS as the back-end. The project is developed in 5 manageable increments:

#### Increment 1: Design of Database

Design and define database, create schema and tables, with necessary attributes. Each of these attributes will have a name and a data-type. Implementation of primary keys and foreign keys is required. Normalize the tables.

#### Increment 2: Data Definition

Implement the above database design into the database software of your choice. The interface may be web-based or otherwise (ease of use & presentation will contribute towards grade).

#### Increment 3: Data Manipulation

Develop data input and manipulation capabilities into your DBMS. External software (e.g. web-application) should be able to use the functions provided by you to insert and manipulate data into particular tables of a particular schema. Data entered should be checked for compatibility with the data-type of the attributes. Checking primary keys and foreign keys for consistency is optional (bonus).

#### Increment 4: Querying

Your DBMS should be enhanced to support querying. Embedded queries are optional (bonus). The input can be SQL or any other self-defined method, and the output should be shown on the interface or returned to the calling function in an appropriate format (e.g. two dimensional array). Primitive querying such as the following should be supported: Complex joins may be supported.

```
SELECT X.x, Y.y FROM X, Y WHERE X.x = Y.y AND Y.y = 10;
```

#### Increment 5: Web-Application/Desktop Application

Create a website/ desktop application that is able to interact with the database in the back-end. The design and functionalities of the website/ desktop application will also be evaluated.

### Presentation

You will be required to present your project. Your presentation should include a description of your design (e.g. using diagrams) in each increment, difficulties encountered and solved in the design and implementation processes, tools used, advanced techniques supported by your DBMS, and a demonstration of your web-application that is based on your DBMS. A full report should be submitted at this time. The report should include in detail (i.e. diagrams and explanation) your design of each increment, tools used, difficulties encountered, and testing mechanisms. An ER-diagram for your web-application should also be given. Design details of your web-application are not required.

### Notes

*All modules developed should have an extensible design for further additions.*

*All code should be fully documented.*

*You may use any programming language that you wish. Recommended: Java*

*For each increment, submit software files and a brief report containing general design outline, tools used and difficulties faced.*

*1. Intermediate assessment: 20 marks.*

*Work knowledge and Involvement: 15 marks*

*Attendance and Regularity: 5 marks*

*2. End semester assessment: 30 marks. The end semester assessment will consist of project presentation and a viva voce.*

*Level of completion and demonstration of Functionality and specifications: 13 marks*

*End-Semester presentation & Oral examination: 10 marks*

*Project Report: 7 marks*

## IT 15-1601 FINANCIAL MANAGEMENT & E-BANKING

### Course Objectives:

To provide students with a solid foundation in fundamentals required for finance management.

### Course Outcomes:

On completion of this course the student will be able to

1. Acquire the separation of ownership and control, Accounting concepts and conventions, Accounting equation, Balance sheet and Bookkeeping, Division of the ledger.
2. Acquire the Cost Accounting, Classifying costs, Budgeting, Standard costing, Variance analysis and Marginal costing.
3. Acquire the Meaning, Importance, Definition of terms, Funds and Flow, Sources and use of funds, changes in working capital.
4. Prepare the funds flow statements and Cost Reduction.

### Module I

The basic concepts of Accounting: The separation of ownership and control, The users of accounts, Computers and users of accounts, Accounting concepts and conventions, Accounting equation, Balance sheet, Classifying items, The processing function. Book-Keeping: The double-entry system, Double-entry of expenses, Asset of stock, Capital and revenue expenditure, Balancing accounts on computers, The trial balance, The final accounts, Depreciation, Bad debts and provision for bad debts, Division of the ledger, Books of original entry, Source documents, Accounting systems, Interpretation of accounts.

### Module II

Costing: Cost Accounting, Classifying costs, Break-even analysis, Break-even graphs, Marginal costing. Ratio Analysis: Ratio meaning, profitability ratios, profit in relation to sales, profit in relation to investments, Liquid ratios, Solvency ratios, other ratios, Activity ratios, Eps, DuPont Financial analysis, ratios for predicting bankruptcy, Inter-firm comparison, ratios limitations.

### Module III

Fund Flow Statement: Meaning, Importance, Definition of terms, Funds and Flow, Sources and use of funds, Changes in working capital, Preparation of funds flow statements, cash flow statements, Sources and uses, preparation. Cost Reduction: Difference between cost control and cost reduction, Prerequisites for an effective cost reduction, Concept of value analysis- crux of the cost reduction, steps involved in introducing a cost reduction program, some examples of cost reduction, Common limitations.

### Module IV

E-BANKING - Changing Dynamics in the Banking Industry, Changing Consumer Needs, Cost, Demographic Trends, Regulatory Reform, and Technology Based Financial services products. Home Banking Implementation Approaches, Home Banking Using Bank's Proprietary Software, Banking via the PC Using Dial-Up Software, Banking via Online Services, Banking via the Web: Security First Network Bank. Open versus Closed Models, Management Issues in Online Banking, Differentiating Products and Services, Managing Financial Supply Chains, Pricing Issues in Online Banking, Marketing Issues: Attracting Customers, Keeping Customers, Back- Office Support for Online Banking, Integrating Telephone Call Centers with the Web.

### References

1. Dhameja, N., Sastry, K., & Dhameja, K. (2014). Finance and accounting for managerial competitiveness (Revised and enlarged ed.). S. Chand & Company. New Delhi
2. Brigham, E., & Houston, J. (2004). Fundamentals of financial management (10th ed.). Thomson/South-Western. Mason, Ohio.
3. Shukla, M., & Grewal, T. (1967). Advanced accounts, (6th rev. and enl. ed.). S. Chand. Delhi.
4. Kalakota, R., & Whinston, A. (1997). Electronic commerce: A manager's guide. Addison-Wesley. Reading, Mass.
5. Khan, M., & Jain, P. (2000). Theory and problems in financial management (2nd ed.). Tata McGraw-Hill. New Delhi.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10, Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## CS/IT 15-1602 COMPILER CONSTRUCTION

### Course Objectives

1. To introduce the concepts and principles of compiler design
2. To provide understanding of grammar for syntax and semantic verification of programming statements
3. To enrich the knowledge in various phases of compiler- lexical analysis, syntax and semantic analysis intermediate code generation, code optimization, machine code generation and use of symbol table

### Course Outcomes:

On completion of this course the student will be able to

1. understand different phases of a compiler and their functions
2. design scanners and parsers using top-down and bottom-up parsers and build abstract syntax trees
3. Gain knowledge of LEX tool & YACC tool to develop scanner and parser.
4. use symbol tables for type checking and other semantic checks
5. understand different types of intermediate codes in compilers
6. understand various forms of code optimization techniques to improve the performance of a program
7. determine code generation techniques

### Module I

Compiler: Introduction – Analysis of the source program – phases of a compiler – Lexical analysis – Role of the lexical analyser – Input Buffering -- Specification of tokens – Recognition of tokens – Lexical analyser generators.

### Module II

Syntax Analysis – Role of the parser – Context free grammars – Top-down parsing – Bottom-up parsing – Operator precedence parsing – LR parsers (SLR, Canonical LR, LALR) – Parser generators.

### Module III

Syntax-directed translation – Syntax-directed definitions – S-attributed definitions – L-attributed definition – Top-down and bottom-up translation – Type checking – Type systems – Specification of a type checker. Run time environment – Source language issues – Storage organization – Storage allocation strategies – Access to nonlocal names – Symbol tables.

### Module IV

Intermediate code generation – Intermediate languages – Declarations – Assignment Statement – Boolean expression – Procedure calls - Code optimization – Introduction – Sources of optimization – Introduction to data flow analysis. Code generator – Issues in the design of a code generator, the target machine, A simple code generator.

### References

1. Aho, A. (2013). Compilers: Principles, Techniques, and Tools. (2nd ed.). Pearson. Harlow.
2. Loudon, K. (2004). Compiler Construction Principles And Practice. Thomson.
3. Cooper, K., & Torczon, L. (2004). Engineering a compiler. Morgan Kaufmann. San Francisco, Calif.
4. Muchnick, S. (1997). Advanced compiler design and implementation. Morgan Kaufmann. San Francisco, Calif.:

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1603 OBJECT ORIENTED MODELING & DESIGN

### Course Objectives:

1. Understand Object Oriented Modelling and Design Principles using UML notations.

### Course Outcomes:

On completion of this course the student will be able to

1. Acquire basics of use case modelling.
2. Acquire the skills to develop static structural aspects of a system based on UML.
3. Acquire knowledge on interaction modelling
4. Acquire expertise on representing the states of an object
5. Acquire knowledge in Object Constraint Language (OCL).

### Module I

Introduction to UML and Unified Process. Use case modeling: Actors and Use cases, Use case specification, Actor generalization, Use case generalization. Objects and classes, Relationships, Inheritance and Polymorphism, Packages.

### Module II

Use case realization: Interactions, Sequence diagrams, Communication diagrams, Interaction occurrences. Activity diagrams: Activity semantics, activity partitions, Sending signals and accepting events, Interaction overview diagrams.

### Module III

Design: Design workflow, well-formed design classes, Refining analysis relationships. Interfaces and components. State machine diagrams, Composite states, submachine states.

### Module IV

Implementation workflow, Deployment, Introduction to OCL: Need of OCL, OCL expression syntax, Types of OCL expressions. Introduction to Software Architecture, Architecture description language (ADL)

### References:

1. Arlow, J., & Neustadt, I. (2005). UML 2 and the unified process: Practical object-oriented analysis and design (2nd ed.). Addison-Wesley.
2. Blaha, M., & Rumbaugh, J. (2005). Object-oriented modeling and design with UML (2nd ed.). Pearson Education. Upper Saddle River, NJ
3. Larman, C. (2005). Applying UML and patterns: An introduction to object-oriented analysis and design and iterative development (3rd ed.). Prentice Hall PTR. Upper Saddle River, N.J.
4. Booch, G., & Rumbaugh, J. (1999). The unified modeling language user guide. Addison-Wesley. Reading, Mass.
5. Bruegge, B., & Dutoit, A. (2003). Object-oriented software engineering: Using UML, patterns and Java (2nd ed.). Prentice Hall. Upper Saddle River, NJ
6. Jacobson, I., & Booch, G. (1999). The unified software development process. Addison-Wesley. Reading, Mass

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1604 CLOUD COMPUTING

### Objectives:

1. Understand the concepts behind cloud computing

### Course Outcomes:

On completion of this course the student will be able to

1. Get the basic concepts and the fundamentals in distributed computing.
2. Learn the concepts of Virtualization
3. Learn the concept of cloud platform architecture
4. Learn the fundamentals of software oriented architecture

### Module I

Distributed System Models and Enabling Technologies: Scalable Computing over the Internet, Technologies for Network-Based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds, Performance, Security, and Energy Efficiency.

### Module II

Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU, Memory, and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Center Automation

### Module III

Cloud Platform Architecture over Virtualized Data Centers: Cloud Computing and Service Models, Data-Center Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms: GAE, AWS, and Azure, Inter-cloud Resource Management, Cloud Security and Trust Management.

### Module IV

Service-Oriented Architectures for Distributed Computing: Services and Service-Oriented Architecture, Message-Oriented Middleware, Portals and Science Gateways, Discovery, Registries, Metadata, and Databases, Workflow in Service-Oriented Architectures

### References:

1. Hwang, K., & Fox, G. (2012). Distributed and cloud computing: From parallel processing to the Internet of things. Morgan Kaufmann. Amsterdam
2. Erl, T., & Puttini, R. (2013). Cloud computing: Concepts, technology, & architecture. Prentice Hall.
3. Buyya, R., Broberg, J. & Goscinski, A. (2011). Cloud computing principles and paradigms. Wiley. Hoboken, N.J.
4. Furht, B. (2010). Handbook of cloud computing. Springer. New York

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1605 BIG DATA ANALYTICS

### Objectives:

1. To understand the basic concepts of big data, methodologies for analyzing structured and unstructured data.

### Course Outcomes:

On completion of this course the student will be able to

1. Define the concept of Big Data.
2. Learn how to analyze big data for specific results.
3. Learn how to use clustering, classification and regression on Big Data.
4. Learn MapReduce and Hadoop.

### Module I

Introduction to Big Data Analytics: Big Data Overview, State of the Practice in Analytics, Key Roles for the New Big Data Ecosystem  
Data Analytics Lifecycle: Overview, Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize

### Module II

Clustering - Overview of Clustering, K-means, Additional Algorithms  
Association Rules: Overview, Apriori Algorithm, Evaluation of Candidate Rules, Applications of Association Rules, Validation and Testing

### Module III

Regression: Linear Regression, Logistic Regression, Additional Regression Models  
Classification: Decision Trees, Decision Tree Algorithms, Naïve Bayes, Bayes' Theorem, Diagnostics of Classifiers

### Module IV

MapReduce and Hadoop: Analytics for Unstructured Data, MapReduce, Apache Hadoop, the Hadoop Ecosystem, Pig, Hive, HBase, Mahout, NoSQL

### Text Books

1. EMC Education Services. (2015). Data science et big data analytics: Discovering, analyzing, visualizing and presenting data. John Wiley & Sons.
2. Minelli, M., & Chambers, M. (2012). Big Data, Big Analytics Emerging Business Intelligence and Analytic Trends for Today's Businesses. (Online-Ausg. ed.). Wiley.Somerset.
3. Dean, J. (2014). Big data, data mining and machine learning value creation for business leaders and practitioners. John Wiley and Sons.Hoboken, New Jersey.
4. Jannach, D., &Zanker, M. (2010). Recommender Systems an Introduction. Cambridge University Press. Leiden.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV



## IT 15 -16 L1 CLOUD AND DISTRIBUTED COMPUTING LABORATORY

### Course Objectives:

Students will be familiar with Linux OS and its commands. Students will have an idea on cloud, setting up cloud environment and its various services. In addition, they will be familiar to develop applications on a distributed environment.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn the basics of Linux OS commands
2. Install of Openstack Cloud Environment
3. Learn basics of Openstack commands

### A: OpenStack Installation for Ubuntu Environment

1. Add the Identity service
2. Add the Image service
3. Add the Compute service
4. Add the Networking service
5. Add the dashboard
6. Add the Block Storage service
7. Add the Object Storage service
8. Launch an instance

### B: Openstack commands

9. Keystone (Image Services)
10. Nova (Compute)
11. Glance (Image Service)
12. Neutron (Networking)
13. Cinder (Block Storage)
14. Swift (Object Store)

### C: Programming in Distributed environment. Implementations may be done using Python, Scala or Java.

15. Resilient Distributed Dataset operations and passing functions
16. Working with Key/Value Pairs and transformations
17. Broadcast Variables and Piping to External Programs
18. Using Spark SQL in Applications

### References

1. White, T. (2009). Hadoop the definitive guide. O'Reilly Media. Sebastopol, Calif.
2. Grover, M., & Malaska, T. (2015). Hadoop application architectures. O'Reilly.
3. Karau, H., & Konwinski, A. (2015). Learning Spark: Lightening fast data analysis (3rd release. ed.). O'Reilly. Beijing.
4. Ryza, S., & Laserson, U. (2015). Advanced analytics with Spark.

### Note:

1. Continuous assessment: 25 marks

For continuous assessment, the marks may be awarded on the basis of the performance of the student in the laboratory sessions.

Marks for continuous assessment of laboratory courses shall be:

- a) Practical records/Outputs: 10 marks
- b) Regular Lab work: 10 marks
- c) Test: 5 marks

2. End semester assessment: 25 marks. The end semester assessment will consist of an examination and a viva voce.

A candidate shall secure a minimum of 50% marks in the aggregate and 45% minimum in the end semester examination for a pass.



## IT 15-16 L2 MINI PROJECT – ANDROID BASED INTERNET PROJECT

### Course Objectives

To familiarize students with android programming and make them develop an android application which makes use of some of the android services.

### Course Outcomes:

On completion of this course the student will be able to

1. Develop an android application with a good understanding of the Android services that they have used in their project.

**Part A** Students shall develop an Android application making use of the **services** from the following list;

AlertDialog, Loading Spinner, Login Screen, ProgressBar, Navigation, Progress Circle, Push Notification, Session Management, Spelling Checker, TextureView, WebView Layout, Widgets, XML Parsers, Localization, RSS Reader, SharedPreferences, JSON Parser

**Part B** Students shall develop an Android application making use of **minimum of three services** from the following list;

Multimedia – Animations, Audio Capture, AudioManager, Camera, Image Effects, ImageSwitcher, MediaPlayer, JetPlayer,  
Networking – Bluetooth, Network Connection, SIP Protocol, WiFi  
Social Services – Facebook Integration, Google Maps Linkedin Integration, Twitter Integration  
User Interface – Auto Complete, Multitouch, Clipboard, Custom Fonts, Gestures, UI Design, UI Patterns, UI Testing  
Database - PHP/MySQL, Data Backup, SQLite Database, Internal Storage  
Sensors,

### Intermediate 1: Determine the Objective

Perform and document System requirement analysis and Software requirement analysis activities.

Description of the expected software features, constraints, interfaces and other attributes.

Prepare the Software Requirements Specifications (SRS) to document the agreed requirements; to provide the basis for design; to provide the basis for system test

### Intermediate 2: Design the application

Description of how the software will meet the requirements. Also describes the rationale for design decisions taken.

Design document including database design, UI design, Data definition, Manifest file as appropriate to the work.

Prepare the Software Design Description (SDD) to document the design and design decisions in order to provide the basis for implementation and unit test.

Description of the plan and specifications to verify and validate the software and the results.

Prepare the Software Test Documentation (STD) to document how the software will be tested, and record the results.

### Intermediate 3: Develop and refine the application

Create the application using the chosen languages, databases and platform.

Test the application using the test document

Demonstrate the application.

### References:

1. Hohensee, B., & Dharma, A. (2014). Android for beginners: Developing apps using Android Studio. Babelcube.
2. Gerber, A., & Craig, C. (2015). Learn Android Studio build Android apps quickly and effectively. Apress.
3. Phillips, B., & Hardy, B. (2013). Android programming: The Big Nerd Ranch guide (2nd ed.). Addison-Wesley Professional.

### Notes:

*All modules developed should have an extensible design for further additions.*

*All code should be fully documented.*

*For each increment, submit software files and a brief report containing general design outline, tools used and difficulties faced.*

*Intermediate assessment: 20 marks.*

*Work knowledge and Involvement: 15 marks*

*Attendance and Regularity: 5 marks*

*End semester assessment: 30 marks. The end semester assessment will consist of project presentation and a viva voce.*

*Level of completion and demonstration of Functionality and specifications: 13 marks*

*End-Semester presentation & Oral examination: 10 marks*

*Project Report: 7 marks*

## GE 15-1701 PRINCIPLES OF MANAGEMENT

### Course Objectives:

To identify and analyse problems by applying the principles of management

### Course Outcomes:

On completion of the course, the student will be able:

1. To inculcate the ability of formulating, analysing, and solving management problems through the application of scientific management.
2. To introduce the importance of Productivity and Project Management.
3. To get exposed to personnel, marketing and financial management.
4. To understand the principles of economics and IPR aspects

### Module I

Basic concept of Management: Introduction, definitions of managements, characteristics of management, levels of management, management skills, Scientific management - Contributions of Gilbreth and Gantt.

Functions of Management: Planning, forecasting, organizing, staffing, directing, motivating, controlling, co-ordinating, communicating, decision making.

Organization: Introduction, definition of organization, system approach applied to organization, necessity of organization, elements of organization, process of organization, principles of organization, formal and informal organization, organization structure, types of organization structure.

Forms of Business Organization: Concept of ownership organization, types of ownership, Individual ownership, partnership, joint stock company, private and limited company, co-operative organizations, state ownership, public corporation.

### Module II

Productivity and Production: Measurement of productivity, productivity index productivity improvement procedure, Organization by product function. Inventory control: Classification, Functions, inventory models, inventory costs, EOQ, Materials Requirement Planning – Objectives, Functions and methods. Project Management: Functions, Characteristics and feasibility studies.

### Module III

Personnel Management: Introduction, definition, objectives, characteristics, functions, principles and organization of personnel management, Recruitment and training methods.

Markets and Marketing: Introduction, the market, marketing information, market segmentation, consumer and industrial markets, pricing, sales, physical distribution, consumer behaviour and advertisement.

Financial Management: the basic concepts of financial accounts, inflation, profitability, budgets and controls, cost accounting, valuation of stock, allocation of overheads, standard costing, marginal costing, Break even point.

### Module IV

Economics: Principles of economics, problem of scarcity, demand, supply, utility, time value of money, inflation and deflation, determination of price, Consumer Optimization, Consumer Response, Consumer Demand Curve.

IPR Aspects: General introduction to IPR, eligibility for patent, patent information and prior art search, procedure for filing patent application, rights of patent owner and duration, ownership of patent and commercialization, assignment, licensing and technology transfer, designs and Utility models.

### References:

1. Mazda, F. (1998). Engineering management. Addison Wesley. Harlow, England.

2. Koontz, H., & Donnell, C. (1986). Essentials of management (4th ed.). McGraw-Hill. New York.
3. Kotler, P. (1997). Marketing management: Analysis, planning, implementation, and control (9.ed. ed.). Prentice-Hall.
4. Chandra, P. (1984). Financial management: Theory and practice. Tata McGraw-Hill. New Delhi.
5. Monks, J. (1987). Operations management: Theory and problems. McGraw-Hill.
6. Cornish, W., & Llewelyn, D. (2007). Intellectual property: Patents, copyright, trade marks and allied rights (6th [rev.] ed.). London: Sweet & Maxwell.
7. WIPO intellectual property handbook: Policy, law and use. (2001). Geneva: WIPO.
8. Hunt, D., Nguyen, L., & Rogers, M. (2013). Patent searching tools & techniques. Wiley.
9. Sullivan, N. (1995). Technology transfer: Making the most of your intellectual property. Cambridge University Press.
10. Lipsey, R., & Sparks, G. (1979). Economics (3d ed.). New York: Harper & Row.
11. Case, K., & Fair, R. (1999). Principles of economics (5th ed.). Prentice Hall.
12. Mankiw, N. (2008). Principles of economics (5th ed.). Cengage Learning.

*Note:*

*Continuous assessment:*

*I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)*

*II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)*

*Assignments – Maximum marks: 10*

*Attendance – Maximum marks: 5*

*End semester evaluation*

*Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.*

*PART A (10 x 2 = 20 marks)*

*Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules*

*PART B (4 x 10 = 40 marks)*

*Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I*

*Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II*

*Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III*

*Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV*

## IT 15-1702 OPERATIONS RESEARCH

### Course Objectives:

Understand Operations Research models and apply them to real-life problems.

### Course Outcomes:

On completion of this course the student will be able to

1. Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry.
2. Review of the properties of matrices and matrix operations, partitioning of matrices, vectors and Euclidean spaces, able to study Statement of LP problem, slack and surplus variables, basic feasible solutions, Charne's M method, two phase method and Von Neumann's theorem
3. Know about the transportation problem, stepping stone algorithm, U-N method, inequality constraints, degeneracy in transportation problem and Koenig's method
4. Acquire the basic structure of queueing models, exponential and poisson distribution, the birth and death process, queueing models based on Poissons input and exponential services time.

### Module I

Linear Algebra: Review of the properties of matrices and matrix operations, partitioning of matrices, vectors and Euclidean spaces, unit vectors, sum vectors, linear dependence, bases, spanning set, rank, product form of inverse, simultaneous equations, basic solutions, point sets, lines and hyper planes, convex sets, extreme points, fundamental theorem of linear programming.

### Module II

Linear Programming : Statement of LP problem, slack and surplus variables, basic feasible solutions, reduction of feasible solutions to basic feasible solutions, artificial variables, optimality conditions, unbounded solutions, Charne's M method, two phase method, degeneracy, duality. Rectangular zero sum games: Von Neumann's theorem, saddle points, pure and mixed strategies, and formulation of primal and dual LP problem for mixed strategies, dominance graphical solution.

### Module III

Transportation, Assignment & Game problems : the transportation problem, the coefficient matrix and its properties, basic set of column vectors, linear combination of basic vectors, the tableau format, stepping stone algorithm, U-N method, inequality constraints, degeneracy in transportation problem, Koenig's method

### Module IV

Queueing theory : Basic structure of queueing models, exponential and Poisson distribution, the birth and death process, queueing models based on Poisson input and exponential services time, the basic model with constant arrival rate and service rate, finite queue, limited source Q models involving non exponential distributions, single service model with Poisson arrival and any services time distribution, Poisson arrival with constant service time, Poisson arrival with constant service time, Poisson arrival and Erlang service time priority disciplines.

### References

1. Taha, H. (1992). Operations research, an introduction (5th ed.). MacMillan Pub.
2. Hadley, G. (1962). Linear programming. Addison-Wesley Pub.
3. Hillier, F., & Lieberman, G. (1974). Operation research (2nd ed.). Holden-Day. San Francisco.
4. Sasieni, M., & Yaspan, A. (1959). Operations research-methods and problems. New York: Wiley.
5. Nair, N. (2002). Resource management. New Delhi: Vikas Publishing House PVT.
6. Kothari, C. (1982). An introduction to operational research. Vikas Pub. House. New Delhi.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1703 COMPUTER GRAPHICS

### Course Objectives:

Basic understanding of the core concepts of computer graphics.

### Course Outcomes:

On completion of this course the student will be able to

1. Acquire the fundamental principles that underline the computer graphics algorithms
2. Develop, design and implement two and three dimensional graphical structures
3. Learn graphics programming using OpenGL, the most common computer graphics library.
4. Know about computer animation

### Module I

Computer–Aided Design, Virtual-Reality Environments, Data Visualization, Computer art, Entertainment, Education & Training, Visualization, Image- Processing, Graphical User Interfaces, Overview of graphic systems.

Points and Lines, Line drawing algorithms, Circle Generation algorithms, Ellipse generating algorithms, Parallel curve algorithms, Attributes of output primitives.

### Module II

Basic transformations, Matrix representations and homogeneous co-ordinates, Composite transformations, other transformations, Raster methods for transformations. The viewing Pipe-Line, Viewing Co-ordinate reference frame, Window-to-viewport co-ordinate transformation, 2-D viewing functions, Clipping operations.

### Module III

3-D Display methods, 3-D Graphics packages. Polygon surfaces, Curved lines and surfaces, spline representations, Bezier curves and surfaces, B-spline curves and surfaces, Beta splines, Relational splines, Conversion between spline representations, Displaying spline curves, Sweep representations, Constructive Solid-Geometry Methods, Octrees, BSP trees, Fractal Geometry methods. OpenGL primitives-Functions, pipeline, sample programs for drawing 2-D, 3-D objects; event handling and view manipulations

### Module IV

Transformation, Rotation scaling, Other transformations, composite Transformations, 3-D Transformation functions, Modeling and co-ordinate transformations, 3-D Viewing concepts, .Classification of visible surface detection algorithms, Back-face detection, Depth-Buffer method, A-Buffer method, Scan-Line method, Depth- Sorting method, BSP- Tree method, Area subdivision method, Octree methods, Ray-Casting methods, Curved surfaces, Wireframe methods, Visibility- Detection functions, Illumination models and surface rendering methods, colour applications, Computer Animation.

### References:

1. Hearn, D., & Baker, M. (2011). Computer graphics with OpenGL (4th ed., International ed.). Upper Saddle River, N.J.: Pearson Education.
2. Hughes, J. (2013). Computer graphics: Principles and practice (3rd ed.). Addison-Wesley.
3. Hill, F., & Kelley, S. (2007). Computer graphics: Using OpenGL (3rd ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1704 INTERNET OF THINGS

### Course Objectives:

Understand the building blocks of Internet of Things and characteristics.

### Course Outcomes:

On completion of this course the student will be able to

1. Identify the main components composing the Internet of Things
2. Acquire the concept of the Internet of Things in terms of models
3. Familiarise how tools and technologies that are used to create new Internet of Things solutions
4. Explore the interconnection and integration of physical world and cyberspace.

### Module I

Introduction to Internet of Things : Definition & Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates

### Module II

IoT and M2M: M2M, Difference between IoT and M2M, SDN and NFV for IoT

IoT System Management with NETCONF-YANG: Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG

### Module III

IoT Platforms Design Methodology: IoT Design Methodology - 10 steps, Python Packages of Interest for IoT

IoT Physical Devices & Endpoints: What is an IoT Device, Raspberry Pi, pcDuino ,BeagleBone Black, Cubieboard.

Experimental Case Study using Raspberry Pi and Python

### Module IV

IoT Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework - Django, Designing a RESTful Web API

Data Analytics for IoT: Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis , Hadoop YARN

### References:

1. Bahga, A., &Madiseti, V. (2014). Internet of things: A hands-on approach. VPT.
2. McEwen, A., &Cassimally, H. (2014). Designing the internet of things. Chichester: Wiley.
3. Pfister, C. (2011). Getting started with the Internet of things. Sebastapool, Calif.: O'Reilly Media.
4. Norris, D. (2015). The Internet of things: Do-it-yourself projects with Arduino, Raspberry Pi, and Beaglebone Black. Tab Electronics.
5. Greengard, S. (2015). The internet of things. The MIT Press.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-17L1 COMPUTER GRAPHICS LABORATORY

### Course Objective:

1. Implementation of graphics programming mainly using OpenGL.
2. Understanding of GP-GPU

### Course Outcomes:

On completion of this course the student will be able to

1. Create 3D graphical scenes using open graphics library suits
2. Perform image manipulation, enhancement
3. Create animations
4. Create a multimedia presentation/Game/Project
5. Develop applications using GP-GPU

### A: Implement the Exercises Using C / OpenGL / Java

1. Implementation of Algorithms for drawing 2D Primitives
  - a. Line (DDA, Bresenham) – all slopes
  - b. Circle (Midpoint)
2. 2D Geometric transformations
  - a. Translation
  - b. Rotation
  - c. Scaling
  - d. Reflection
  - e. Shear
  - f. Window-Viewport
3. Clipping

### B: Implement the Exercises Using OpenGL

4. 3D Transformations - Translation, Rotation, Scaling
5. 3D Projections – Parallel, Perspective
6. Creating 3D Scenes
7. 2D Animation – To create Interactive animation using any authoring tool

### C: Develop Applications Using GP-GPU

8. Load the GP-GPU processor device with 10,000 random numbers, sort them using CUDA program and get the sorted output on the host machine and print the output.

### Reference:

1. Hearn, D., & Baker, M. (2011). Computer graphics with OpenGL (4th ed., International ed.). Upper Saddle River, N.J.: Pearson Education.
2. Hughes, J. (2013). Computer graphics: Principles and practice (3rd ed.). Addison-Wesley.
3. Hill, F., & Kelley, S. (2007). Computer graphics: Using OpenGL (3rd ed.). Upper Saddle River, NJ: Pearson Prentice Hall

### Note:

1. Continuous assessment: 25 marks

For continuous assessment, the marks may be awarded on the basis of the performance of the student in the laboratory sessions. Marks for continuous assessment of laboratory courses shall be:

- a) Practical records/Outputs: 10 marks
- b) Regular Lab work: 10 marks
- c) Test: 5 marks

2. End semester assessment: 25 marks. The end semester assessment will consist of an examination and a viva voce.

A candidate shall secure a minimum of 50% marks in the aggregate and 45% minimum in the end semester examination for a pass.



## IT 15-17L2 MINI PROJECT – MULTIMEDIA PROJECT

### Course Objectives:

Graduates will be able to develop the project with innovative design concepts, analyze, design and develop the application at different stages of development.

### Course Outcomes:

On completion of this course the student will be able to

1. Use current techniques, skill and tools necessary for animation, Frame and Video Capturing and special Effects Authoring and Presentation and will be able to work in a team in the atmosphere of a professional industry.
2. Implement Multimedia project involving Interactive Computer Graphics technology, working with audio and video capturing. Projects can be done using software's like Blender with Python scripting, OpenCV, Kinect, OpenGL, DirectX etc.

The projects can be of any of the following type

1. Development of Augmented Reality in the areas like education, marketing, advertisement in magazines, movies, astronomy, map, navigator, 3D games, weather condition, Healthcare etc.
2. Development of Virtual Reality in the areas like Military, Education, Healthcare, Entertainment, Fashion, Business, Scientific visualization, Construction, Film, Telecommunication etc.
3. Motion Capturing in Interactive Graphics
4. Lossless and Lossy Media Encoding and Compression
5. Development of media player in multimedia framework like gstreamer, ffmpeg etc
6. Real Time communication using media and IP streaming

### Intermediate 1: Determine the Objective

Perform and document System requirement analysis and Software requirement analysis activities.

Description of the expected software features, constraints, interfaces and other attributes.

Prepare the Software Requirements Specifications (SRS) to document the agreed requirements; to provide the basis for design; to provide the basis for system test

### Intermediate 2: Design the application

Description of how the software will meet the requirements. Also describes the rationale for design decisions taken.

Design document including database design, UI design, Data definition, Manifest file as appropriate to the work.

Prepare the Software Design Description (SDD) to document the design and design decisions in order to provide the basis for implementation and unit test.

Description of the plan and specifications to verify and validate the software and the results.

Prepare the Software Test Documentation (STD) to document how the software will be tested, and record the results.

### Intermediate 3: Develop and refine the application

Create the application using the chosen languages, databases and platform.

Test the application using the test document

Demonstrate the application.

*Notes: All modules developed should have an extensible design for further additions.*

*All code should be fully documented.*

*For each increment, submit software files and a brief report containing general design outline, tools used and difficulties faced.*

*Intermediate assessment: 20 marks.*

*Work knowledge and Involvement: 15 marks*

*Attendance and Regularity: 5 marks*

*End semester assessment: 30 marks. The end semester assessment will consist of project presentation and a viva voce.*

*Level of completion and demonstration of Functionality and specifications: 13 marks*

*End-Semester presentation & Oral examination: 10 marks*

*Project Report: 7 marks*



## GE 15-17L3 Entrepreneurship Development

### Course Objective:

1. Study of this subject provides an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.

### Course Outcomes:

On completion of this course the student will be able to

1. Develop awareness about the importance of entrepreneurship opportunities available in the society
2. Get acquainted with the challenges faced by the entrepreneur

### Exercises:

1. To study the types of entrepreneurs and the factors affecting entrepreneurial growth.
2. To make an assessment of the major motives influencing an entrepreneur
3. To make an overview of the various stress management techniques
4. How to identify and select a good business opportunity?
5. Preparation of a techno economic feasibility report for a given project
6. Preparation of a preliminary project report for a given project
7. To identify the various sources of finance and management of working capital
8. Carry out the costing and break even analysis of a proposed project
9. Preparation of a PERT / CPM chart for the various activities involved in a project
10. To make a study of the various causes and consequences of sickness in small business and identify corrective measures.

### References:

1. Roy, R. (2011). Entrepreneurship (2nd ed.) Oxford University Press. Oxford.
2. Gordon, E., & Natarajan, K. (2009). Entrepreneurship development. Himalaya Pub. House. India.
3. Coulter, M. (2001). Entrepreneurship in action. Prentice Hall. Upper Saddle River, N.J.
4. Jain, P. (1998). Handbook for new entrepreneurs. Oxford University Press. Delhi.
5. Khanka, S. (2010). Entrepreneurial development S.S. Khanka. S.Chand&Co, New Delhi, India.

*Note: There will only be continuous evaluation for this course. The evaluation will be based on the performance of the student in the exercises given above. A minimum of 50% marks is required for a pass.*

## IT 15-17L4 PROJECT PHASE I & INDUSTRIAL INTERNSHIP

### Course Objectives:

To identify a research / industry related problem for the undergraduate project work with the guidance of the respective faculty and prepare a design and work plan

### Course Outcomes:

On completion of this course a student will be able to

1. Conduct literature survey in a relevant area of one's course of study and finally identify and concentrate on a particular problem.
2. Formulate a project proposal through extensive study of literature and / or discussion with learned resource persons in industry and around.
3. Generate a proper execution plan of the project work to be carried out in Phase II through thorough deliberations and improve presentation skills

The major project work shall commence in the seventh semester and completed by the end of eighth semester. Students are expected to identify a suitable project and complete the analysis and design phases by the end of seventh semester.

Each batch comprising of 3 to 5 students shall identify a project related to the curriculum of study. At the end of the semester, each student shall submit a project synopsis comprising of the following.

1. Application and feasibility of the project
2. Complete and detailed design specifications.
3. Block level design documentation
4. Detailed design documentation including circuit diagrams and algorithms / circuits
5. Bill of materials in standard format and cost model, if applicable
6. Project implementation action plan using standard presentation tools

*\*\*\*\*\*Industrial internship for a minimum duration of two weeks during May / June vacation before the commencement of seventh semester classes is highly desirable. Those who completed the internship should submit a report based on it, along with the project design report.*

### Guidelines for evaluation:

1. Attendance and Regularity	10
2. Quality and adequacy of design documentation	10
3. Concepts and completeness of design	10
4. Theoretical knowledge and individual involvement	10
5. Quality and contents of project synopsis	10
Total	50 Marks

### Note:

Points (1)-(3) to be evaluated by the respective project guides and project coordinator based on continuous evaluation.

Points (4)-(5) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.

## IT 15-1801 ELECTRONIC BUSINESS AND SERVICES

### Course Objectives:

1. Understand e-Commerce and e-Business and their types.
2. Understand the main e-Business Models.

### Course Outcomes:

On completion of this course the student will be able to

1. Explain the various e-business models, trends and practices
2. Acquire knowledge in e-Marketplaces.
3. Discuss modern computing infrastructures from the perspective of the internet and organisations
4. Discuss and explain theoretical and practical issues of conducting business over the internet and the Web

### Module I

E-COMMERCE TO E-BUSINESS: Defining e-business – development of new economy – Types of e-business. E-business markets and models – e-business environment, market places, models – Types of e-business models – Framework for analyzing e business.

E-BUSINESS TREND SPOTTING: Increase Speed of Service - Self-Service – Provide Integrated Solutions-Integrate Sales and Service - Customization and Integration – Customer Service Consistent and Reliable - Service Delivery - Contract Manufacturing - Increase Process Visibility -Employee Retention -Integrated Enterprise Applications - Multichannel Integration

### Module II

E-BUSINESS DESIGN: Technology -Constructing an e-Business Design - Self-Diagnosis - Reversing the Value Chain - Choosing a Narrow Focus -Case Study

E-BUSINESS ARCHITECTURE: Functional Integrated Apps -Integrating Application Clusters into an e-Business Architecture –Aligning the e-Business Design with Application Integration.

### Module III

CUSTOMER RELATIONSHIP MANAGEMENT: Integrating Processes to Build Relationships -Customer Relationship Management -Definition -Organizing around the Customer - CRM Architecture -CRM Infrastructure -Implementing CRM -CRM Trends - Building a CRM Infrastructure

SELLING CHAIN MANAGEMENT: Transforming Sales into Interactive Order Acquisition -Defining Selling-Chain Management - Business Forces Driving the Need for Selling -Technology Forces Driving the Need for Selling -Managing the Order Acquisition Process. ENTERPRISE RESOURCE PLANNING: The e-Business Backbone -ERP Decision - Enterprise Architecture Planning- ERP Implementation.

### Module IV

SUPPLY CHAIN MANAGEMENT: Inter-enterprise Fusion -Defining Supply Chain Management – Basics of Internet-Enabled SCM- e-Supply Chain Fusion- Management Issues

E-PROCUREMENT: The Next Wave of Cost Reduction - Isolated Purchasing to Real- Time Process Integration -Operating Resource Procurement- Lack of Process Integration

BUSINESS INTELLIGENCE- Introduction to Knowledge Management Applications and BI

### References:

1. Kalakota, R., & Robinson, M. (2001). E-business 2.0: Roadmap for success. Addison-Wesley. Boston, MA.
2. Combe, C. (2006). Introduction to e-business management and strategy. Butterworth-Heinemann. Amsterdam.
3. Almeida, V. (2000). Scaling for e-business: Technologies, models, performance, and capacity planning. Prentice Hall PTR.
4. Deitel, H., & Deitel, P. (2001). The complete e-business & e-commerce programming training course. Prentice-Hall.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1802 REAL TIME SYSTEMS

### Course Objectives:

Understand the basics and design of real time systems, real time communication and real time databases.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn Basic Model, Characteristics and applications of real time systems.
2. Learn types of Real Time Tasks, Timing Constraints, Real Time Task Scheduling, Real time Tasks in Multiprocessor and distributed systems, Clocks in distributed real time systems.
3. Learn resource sharing among real time tasks, Priority Inheritance protocol, Highest Locker Protocol, Priority Ceiling Protocol, Windows as a real time operating system, POSIX, Benchmarking real time systems.
4. Learn Real Time communications and Real Time data bases.

### Module I

Introduction: Basic Model, Characteristics and applications of real time systems, Safety and Reliability, Types of Real Time Tasks, Timing Constraints. Real Time Task Scheduling: clock driven scheduling, event driven scheduling, Rate monotonic algorithm. Scheduling Real time Tasks in Multiprocessor and distributed systems. Clocks in distributed real time systems.

### Module II

Resource sharing among real time tasks, Priority inversion, Priority Inheritance protocol, Highest Locker Protocol, Priority Ceiling Protocol, Handling task dependencies.

Real Time operating system features, Unix as a real time operating system, Windows as a real time operating system, POSIX, Benchmarking real time systems.

### Module III

Real Time Communication: Basic concepts, Real time communication in a LAN, Bounded access protocols for LANs, Real time communication over packet switched networks, Routing, Resource reservation, Rate control, QoS Models.

### Module IV

Real Time databases: Applications of real time databases, real time database application design issues, characteristics of temporal data, concurrency control in real time databases, locking based concurrency control protocols, optimistic concurrency control protocols, speculative control protocols.

### Reference:

1. Mall, R. (2008). Real-time systems theory and practice. Dorling Kindersley. New Delhi.
2. Liu, J. (2000). Real-Time systems. Prentice Hall.
3. Prasad, K. (2005). Embedded real-time systems. DreamTec. New Delhi.
4. Douglass, B. (2007). Real time UML workshop for embedded systems. Elsevier.
5. Simon, D. (1999). An embedded software primer. Addison-Wesley.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT15-1803 SECURITY & CYBER LAWS

### Course Objectives:

Students can establish responsibility and accountability for information security in organizations and also be aware of the Cyber laws.

### Course Outcomes:

On completion of this course the student will be able to

1. Make aware of various security threats in computing, database, network etc.
2. Get an idea on various Cryptographic techniques to secure the data.
3. Learn the basic security measures in networking.
4. Make aware of the existing Cyber laws and Acts on information security.

### Module I

Security Problem in Computing: Characteristics of computer intrusion, Attacks, Computer Criminals  
Program Security: Viruses and Other Malicious Code, Targeted Malicious Code, Controls against Program Threats

### Module II

Cryptography: Terminology and Background, Substitution Ciphers, Transpositions, Characteristics of good Encryption Algorithms, Data Encryption Standard, AES Encryption Algorithm, Public Key Encryption, The Uses of Encryption

### Module III

Data and Networking Security: Security Requirements, Reliability and Integrity, Sensitive Data, Inference  
Security in Networks: Threats in Networks, Network Security Controls, Firewalls

### Module IV

Security Policies and Cyber Laws: Need for an Information Security Policy, Information Security Standards - ISO, Introducing Various Security Policies and Their Review Process, Introduction to Indian Cyber Law, Objective and Scope of the IT Act, 2000, Intellectual Property Issues, Overview of Intellectual-Property- Related Legislation in India, Patent, Copyright, Law Related to Semiconductor Layout and Design, Software License

### References:

1. Pfleeger, C. (2006). Security in computing (4th ed.). Prentice Hall PTR.
2. Tripathi, S. Goel, R. & Shukla, P. Introduction to Information Security and Cyber Laws. Wiley India.
3. Pachghare, V. (2008). Cryptography and Information Security Prentice Hall India.
4. Stallings, W. (1999). Cryptography and network security: Principles and practice (2nd ed.). Prentice Hall.
5. Chander, H. (2012). Cyber Laws And It Protection. PHI Learning Pvt. Ltd

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-18 L1 SEMINAR

### Course Objective

To encourage and motivate the students to read and collect recent and relevant information from their area of interest confined to the relevant discipline from technical publications including peer reviewed journals, conferences, books, project reports, etc., prepare a report based on a central theme and present it before a peer audience.

### Course Outcomes:

On completion of this course the student will be able to

1. Identify and familiarize with some of the good publications and journals in their field of study.
2. Acquaint oneself with preparation of independent reports, name them based on a central theme and write abstracts, main body, conclusions and reference identifying their intended meaning and style.
3. Understand effective use of tools of presentation, generate confidence in presenting a report before an audience and improve their skills in the same.
4. Develop skills like time management, leadership quality and rapport with an audience.

Students shall individually prepare and submit a seminar report on a topic of current relevance related to the field of Information Technology and trends. The reference shall include standard journals, conference proceedings, reputed magazines and textbooks, technical reports and URLs. The references shall be incorporated in the report following IEEE standards reflecting the state-of-the-art in the topic selected. Each student shall present a seminar for about 30 minutes duration on the selected topic. The report and presentation shall be evaluated by a team of internal experts comprising of 3 teachers based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the seminar report.

### Guidelines for evaluation:

1. Attendance and Regularity	10
2. Abstract / Topic	5
3. Report	10
4. Presentation and oral examination	25
Total	50 Marks

### Note:

*Points (1)-(3) to be evaluated by the respective guide based on continuous evaluation.*

*Points (4) to be evaluated by the final evaluation team comprising of 3 internal examiners including the guide.*

## IT 15-18L2 PROJECT PHASE II

### Course Objectives:

To enable students to apply any piece of theory and experiments which they have learned to a specific problem related to industry / research which is identified with the help of a guide in Phase I and solve it.

### Course Outcomes:

On completion of this course a student will be able to

1. Realize various steps involved in conducting a project work, like literature survey, methodology adopted – field study / survey / experiments / numerical work, analysis of the data to arrive at final results and conclusions, etc.
2. Initiate a habit of proper report writing with all of its major components, proper style of writing and preparation of a distinct abstract and carved out conclusions.
3. Conceive the pros and cons of working in a team and the wonderful results which could evolve through team-work.
4. Present and defend self-prepared and corrected report (with the help of project guide) of a self-created work to a peer audience

The project work commencing from the seventh semester shall be completed and the project report shall be submitted by each student by the end of eighth semester. There shall be an internal examination of the project that includes a presentation, demonstration and oral examination of the project work.

Each batch of students shall develop the project designed during the VII semester. The implementation phase shall proceed as follows:

- A detailed algorithm level implementation, test data selection, validation, analysis of outputs and necessary trial run shall be done.
- Integration of hardware and software, if applicable, shall be carried out.
- A detailed project report in the prescribed format shall be submitted at the end of the semester. All test results and relevant design and engineering documentation shall be included in the report.

The work shall be reviewed and evaluated periodically

A committee consisting of the Project Coordinator (appointed by the Head of the Department/Division) Project guide and at least one senior faculty member will carry out the assessment based on at least one interim review and a final review just before the submission of the project report.

The final evaluation of the project shall be done by a team of minimum 3 internal examiners including the project guide and shall include the following.

1. Presentation of the work
2. Oral examination
3. Demonstration of the project against design specifications
4. Quality and content of the project report

### Guidelines for evaluation:

1. Attendance and Regularity	40
2. Work knowledge and Involvement	40
3. End semester presentation and oral examination of completion and demonstration	40
4. Level of functionality/specifications	40
5. Project Report – Presentation style and content	40
Total	200 Marks

### Note:

Points (1)-(3) to be evaluated by the respective project guides and project coordinator based on continuous evaluation.

Points (4)-(5) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.

## **IT 15-18L3 COMPREHENSIVE VIVA-VOCE**

### **Course Objectives**

To test the student's learning and understanding of the theory and applications of the various concepts taught during the entire course of their programme and to prepare the students to face interviews in both the academic and industrial sectors.

### **Course Outcomes**

On completion of this course the student will be able to

1. Refresh all the subjects covered during the programme
2. Gain good knowledge of theory and practice
3. Develop oral communication skills and positive attitude
4. Face technical interviews with confidence

Each student is required to appear for a viva-voce examination at the end of the complete course work. The examination panel shall comprise of a minimum of one internal examiner and one external examiner, both appointed by the University. The examiners shall evaluate the students in terms of their conceptual grasp of the course of study and practical/analysis skills in the field.



## IT15-1606 E1. MULTIMEDIA COMPUTING

### Course Objectives:

1. Lays the foundation to build multimedia computing applications comprising of images, videos, and audio.

### Course Outcomes:

On completion of this course the student will be able to

1. Familiarize with the common computing fundamentals employed in a variety of multimedia applications.
2. Learn different compression principles, different compression techniques, different multimedia compression standard.
3. Learn the characteristics of multimedia database and how to manage it.
4. Design and develop multimedia systems according to the requirements of multimedia applications

### Module I

Introduction to Multimedia-media and Data streams-properties of a multimedia system- Data streams characteristics-information units- Multimedia Hardware platforms-Memory and storage devices-Input and output devices-Multimedia software tools.

### Module II

Multimedia Building blocks- Audio: Basic sound concepts- Music-speech-audio file formats- Images and graphics: Basic concepts- computer image processing- Video and Animation: Basic concepts- Animation techniques.

### Module III

Data compression: Storage space and coding requirements- source, entropy and Hybrid coding- Basic compression techniques- JPEG- H.261- MPEG- DVI- Multimedia Database systems- Characteristics of Multimedia Database Management system- data analysis- Data structure- operations on data- Integration in a database Model.

### Module IV

Multimedia Documents- Hypertext and Hypermedia- document architecture SGML Document architecture ODA- MHEG. Multimedia applications- Introduction- Media Preparation- Media composition- Media Integration- Media communication – Media consumption – Media entertainment- trends

### References:

1. Steinmetz, R., &Nahrstedt, K. (1995). Multimedia: Computing, communications, and applications. Prentice Hall.
2. Parekh, R. (2006). Principles of multimedia. Tata McGraw-Hill. New Delhi.
3. Buford, J. (1994). Multimedia systems/Ed.[by] J.F.K. Buford. Addison-Wesley.
4. Vaughan, T. (1996). Multimedia: Making it work (3rd ed.). Osborne/McGraw-Hill.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1606 E2. WIRELESS NETWORKING

### Course Objectives:

1. To learn about the theoretical concepts and principles of wireless networking.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn the basic wireless communication techniques.
2. Learn an overview of Satellite and cellular wireless networks
3. Learn an overview of wireless LAN
4. Learn various wireless system standards and their basic operation cases.

### Module I

Introduction: Cellular Revolution, Global Cellular Network, Broadband.

Transmission Fundamentals: Signals for Conveying Information, Analog and Digital Data Transmission, Channel Capacity, Transmission Media, Multiplexing.

Communication Networks: Switching Techniques, Circuit Switching, Packet Switching, Asynchronous Transfer Mode.

Protocols and the TCP/IP Suite: The Need for a Protocol Architecture, The TCP/IP Protocol Architecture, The OSI Model, Internetworking.

### Module II

Wireless Communication Technology: Antennas and Propagation, Signal Encoding Techniques, Spread Spectrum, Coding and Error Control.

### Module III

Wireless Networking: Satellite Communications, Cellular Wireless Networks, Cordless Systems and Wireless Local Loop, Mobile IP and Wireless Access Protocol.

### Module IV

Wireless LANs: Wireless LAN Technology, Wi-Fi and the IEEE 802.11 Wireless LAN Standard, Bluetooth and IEEE 802.15

### References:

1. Stallings, W. (2009). Wireless communications & networks (2nd ed.). Pearson.
2. Kurose, J., & Ross, K. (2013). Computer networking: A top-down approach (6th ed.). Pearson. Boston
3. Muller, N. (2001). Bluetooth demystified. McGraw-Hill.
4. Umar, A. (2004). Mobile computing and wireless communications: Applications, networks, platforms, architectures, and security. NGE Solutions.
5. Tse, D., & Viswanath, P. (2005). Fundamentals of wireless communication. Cambridge University Press.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1606 E3. SOFT COMPUTING

### Course Objectives:

1. Familiarize with soft computing concepts such as fuzzy theory, neuro fuzzy and genetic algorithms.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn fuzzy set theory, fuzzy rules and inference systems.
2. Learn on neural networks and supervised and unsupervised learning networks.
3. Comprehend neuro fuzzy modeling.
4. Get an introduction to Genetic Algorithms.
5. Able to develop applications using soft computing methods.

### Module I

INTRODUCTION: Neuro-Fuzzy and Soft Computing. FUZZY SET THEORY: Fuzzy Sets -Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems.

### Module II

REGRESSION AND OPTIMIZATION: Least-Squares Methods for System Identification - Derivative-Based Optimization- Derivative-Free Optimization.

NEURAL NETWORKS: Adaptive Networks - Supervised Learning Neural Networks -Learning from Reinforcement – Unsupervised learning and Other Neural Networks.

### Module III

NEURO-FUZZY MODELING: ANFIS: Adaptive-Networks-based Fuzzy Inference Systems –Co active Neuro-Fuzzy Modeling: Towards Generalized ANFIS.

ADVANCED NEURO-FUZZY MODELING: Classification and Regression Trees -Data Clustering Algorithms - Rule base Structure Identification.

### Module IV

NEURO-FUZZY CONTROL: Neuro-Fuzzy Control I -Neuro-Fuzzy Control II

ADVANCED APPLICATIONS: ANFIS Application- Fuzzy-Filtered Neural Networks-

Fuzzy Theory and Genetic Algorithms in Game Playing-Soft Computing for Color Recipe Prediction.

### References:

1. Jang, J., & Sun, C. (1997). Neuro-fuzzy and soft computing: A computational approach to learning and machine intelligence. Prentice Hall.
2. Yen, J., & Langari, R. (2003). Fuzzy logic: Intelligence, control, and information. Pearson Education.
3. Kosko, B. (1997). Neural networks and fuzzy systems: A dynamical systems approach to machine intelligence. Prentice Hall.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT15-1606 E4. SOFTWARE QUALITY AND TESTING

### Course Objectives:

Understanding software testing process, planning, strategy, criteria, and testing methods, as well as software quality assurance concepts & control process.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn the fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. Learn about software quality management.
3. Learn different types of testing.
4. Gain the techniques and skills on how to use modern software testing tools to support software testing projects.

### Module I

Quality Assurance Basics: Definition of Quality, Total Quality management. Four Dimensions of Quality: Specification Quality, Design Quality, Development Quality, Conformance Quality, Software Product Quality: white box standpoint vs functionality standpoint, Program Quality

### Module II

Quality Assurance department: Role, position, organisation and staffing. Software Verification: walkthroughs, inspections, audits, process. Validation: Definition, software designs, product specification, software product. Familiarization with testing tools like Selenium.

### Module III

Principles of Testing, Software Development Life Cycle Models. Types of Testing: White Box Testing, Black Box Testing, Integration Testing, System and Acceptance Testing, Performance Testing, Regression Testing, Internationalization (I18n) Testing, Ad hoc Testing, Usability and Accessibility Testing

### Module IV

People and organizational issues in testing: Common People Issues, Organization Structures for Testing Teams, Test Planning, Management, Execution, and Reporting. Test Management and automation: Software Test Automation, Test Metrics and Measurements

### References:

1. Chemuturi, M. (2011). Mastering software quality assurance best practices, tools and techniques for software developers. J. Ross Pub.
2. Desikan, S., & Ramesh, G. (2006). Software testing principles and practices. Dorling Kindersley (India).
3. Graham, D. (2008). Foundations of software testing: ISTQB certification (Rev. ed.). Course Technology Cengage Learning. Australia.
4. Beizer, B. (2003). Software testing techniques. Dreamtech Press.
5. Myers, G., Sandler, C., Badgett, T., & Thomas, T. (2004). The art of software testing. John Wiley & Sons.
6. Tian, J. (2009). Software quality engineering Testing, quality assurance, and quantifiable improvement. John Wiley & Sons.
7. Kan, S. (2003). Metrics and models in software quality engineering. Addison-Wesley.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT15-1606 E5. ADVANCED COMPUTER ARCHITECTURE

### Course Objectives:

1. To understand the working principle of parallel computers.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn Parallel computing methods.
2. Learn the different classification of parallel computers
3. Learning about pipelining and superscalar techniques
4. Get a better understanding of parallel programming

### Module I

Parallel Computer methods: The state of computing -Multiprocessor and multicomputers-Multivector and SIMD computers-PRAM and VLSI models-Architectural development tracks.

Program and Network properties: Condition of parallelism-Program partitioning and scheduling-Program flow mechanism-System interconnect architecture.

Principles of Scalable Performance: Performance matricides and measures-Parallel processing applications-Speedup performance laws-Scalability analysis and approaches.

### Module II

Processors and Memory Hierarchy: Advanced processor technology-Superscalar and vector processors-Memory hierarchy technology-Virtual memory technology.

Bus, Cache and Shared Memory: Bus System-Cache memory organizations-Shared memory organization-Sequential and weak consistency models.

### Module III

Pipelining and superscalar techniques: Linear pipeline processors-Nonlinear pipeline processors-Instruction pipeline design-Arithmetic pipeline design.

Parallel and scalable architectures: Multiprocessor system interconnect-Cache coherence and synchronization mechanism-Three generations of multicomputers-Message passing mechanism-Vector processing principles-SIMD computer organization-Principles of multi-threading-Fine grain multicomputers.

### Module IV

Parallel programming: Parallel programming models-Parallel language and compilers-Dependency analysis-Code optimization and scheduling-loop parallelization- MPI and PVM libraries.

Instruction level parallelism: Design issue-Models of typical processor-compiler directed instruction level parallelism-Operand forwarding-Tomasulo's algorithm-Branch prediction-Thread level parallelism.

### References:

1. Hwang, K. (2011). Advanced computer architecture: Parallelism, scalability, programmability (2nd ed.). McGraw-Hill.
2. Sima, D., & Fountain, T. (2012). Advanced computer architectures: A design space approach. Addison-Wesley.
3. Shiva, S. (2006). Advanced computer architectures. CRC Taylor & Francis.
4. Culler, D., & Singh, J. (2000). Parallel computer architecture: A hardware/software approach. Morgan Kaufmann. San Francisco
5. Rajaraman, V., & Murthy, C. (2004). Parallel computers: Architecture and programming (Eastern economy ed.). New Delhi: Prentice-Hall of India.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV

## IT15-1705 E1. GAME DESIGN

### Course Objectives:

1. To get subsequent understanding of game design and development, which includes the processes, mechanics, issues in game design, game engine development, modeling, techniques, handling situations, and logic.

### Course Outcomes:

On completion of this course the student will be able to

1. Get an essential understanding of game programming, game design principles, gaming engine design and gaming frameworks.
2. Know about the basic gaming platforms and frameworks.
3. Get an exposure to 3D graphics principles and animation techniques
4. Create interactive games.

### Module I

3D GRAPHICS FOR GAME PROGRAMMING -Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation

### Module II

GAME DESIGN PRINCIPLES -Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding

### Module III

GAMING ENGINE DESIGN-Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics

### Module IV

GAMING PLATFORMS AND FRAMEWORKS -Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DXStudio, Unity GAME DEVELOPMENT - Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

### References:

1. Eberly, D. (2006). 3D game engine architecture engineering real-time applications with Wild Magic (2nd ed.). Morgan Kaufman.
2. Han, J. (2011). 3D graphics for game programming. Chapman and Hall/CRC.
3. McShaffry, M. (2009). Game coding complete (3rd ed.). Course Technology Cengage Learning.
4. Adams, E., & Rollings, A. (2010). Fundamentals of game design (2nd ed.). New Riders.
5. Pedersen, R. (2009). Game design foundations. (2nd ed.) Wordware Pub.
6. Rogers, S. (2014). Level up! the guide to great video game design (2nd ed.). Hoboken: Wiley.
7. Gregory, J. (2009). Game engine architecture. Wellesley, Mass.: A K Peters.
8. Novak, J. (2005). Game development essentials: An introduction. Thomson/Delmar Learning.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT 15-1705 E2. MOBILE COMPUTING

### Course Objectives:

1. Understanding of wireless and mobile communication network's working, its technical features, and what kinds of applications it can support.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn mobile computing architecture and operating system for mobile computing.
2. Organize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities.
3. Know about the emerging wireless networks.
4. Learn about wireless security.

### Module I

Review of wireless and mobile communication -Mobile computing architecture-Pervasive Computing-Voice oriented data Communication, Operating System for Mobile Computing, Mobile Devices, cards and sensors, Mobile computing applications: messaging-SMS-MMS-GPRS applications- Mobile agents.

### Module II

Wireless Internet-Mobile IP-wireless web-Web services and mobile web services- Wireless middleware-wireless gateway and mobile application servers-Wireless Access Protocol(WAP)-WAP protocol layers. Mobile database management:-data caching, transaction models, processing queries, Data recovery, QoS .Mobile Transport Layer

### Module III

Cellular network- First Generation Networks-Second generation (2G): GSM-CDMA network .data over cellular network- 2.5G network-GPRS-GPRS System Architecture and Protocol layers. EDGE. Third generation network(3G) network-MMS-introduction to 4G and 5G systems-Emerging wireless networks: Ultra wide band(UWB)-Free space optics(FSO)-Mobile ad-hoc network(MANET)-Wireless sensor networks-OFDM and Flash OFDM

### Module IV

Wireless security-WLAN security-cellular wireless network security-Mobile ad-hoc network security-Internet security protocols: VPNs and IPSec-Wireless middleware security-SSL for wireless web security-WAP security and WTLS. Client programming tools-using XML and UML for mobile computing –J2ME.

### References:

1. Kamal, R. (2012). Mobile computing (2nd ed.). Oxford University Press.
2. Talukder, A., &Yavagal, R. (2007). Mobile computing: Technology, applications, and service creation. McGraw Hill.
3. Umar, A. (2004). Mobile computing and wireless communications: Applications, networks, platforms, architectures, and security. NGE Solutions.
4. Hansmann,U., Merk,L., Niclous,M., &Stober. (2006). Principles Of Mobile Computing (2nd ed.). Dreamtech Press
5. Schiller, J. (2000). Mobile communications. Addison-Wesley.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV



## IT 15-1705 E3. AGILE PROJECT MANAGEMENT

### Course Objectives

To impart a thorough understanding of the principles and practices used in agile software development

### Course Outcomes:

On completion of this course the student will be able to

1. Learn the principles behind the agile approach to software development
2. Enable them to positively contribute as an agile team member with a better understanding of various phases.
3. Develop a more advanced, applied level of knowledge to gain an understanding of Agile and the ability to apply relevant project management methods, leading to successful Agile projects
4. Learn the different management styles needed for successful Agile projects compared to traditional projects

### Module I

The Agile Revolution, Agile Business Objectives , Agility Defined , Agile Leadership Values, Agile Performance Measurement, Iterative, Feature-Based Delivery Teams over Tasks , Leading Teams , Building Self-Organizing (Self-Disciplined) Teams , Participatory Decision Making

### Module II

An Agile Project Management Model , An Agile Enterprise Framework , An Agile Delivery Framework The Envision Phase, Product Vision , Project Objectives and Constraints , Project Community

### Module III

The Speculate Phase , Speculating on Product and Project , Product Backlog , Release Planning  
Advanced Release Planning , Release (Project) Planning , Wish-based Planning (Balancing Capacity and Demand) , Capabilities , Value Point Analysis

### Module IV

The Explore Phase , Agile Project Leadership , Iteration Planning and Monitoring , Coaching and Team Development, Collaboration and Coordination, The Adapt and Close Phases , Adapt , Product, Project, and Team Review and Adaptive Action

### References:

1. Highsmith, J. (2010). Agile project management: Creating innovative products (2nd ed.). Addison-Wesley.
2. Shore, J., & Warden, S. (2008). The art of agile development. O'Reilly Media.
3. Martin, R. (2003). Agile software development: Principles, patterns, and practices. Prentice Hall.
4. Cohn, M. (2010). Succeeding with agile: Software development using Scrum. Addison-Wesley.
5. Cockburn, A. (2006). Agile software development (2nd ed.). Addison-Wesley.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV



## IT15-1705 E4. DATA MINING

### Course Objectives:

1. Understanding of the basic concepts, principles and techniques of data mining.
2. Enabling knowledge in managing and evaluating data mining applications and appropriate use of stored data.

### Course Outcomes:

On completion of this course the student will be able to

1. Classify different data mining systems.
2. Know the role of data warehousing and enterprise intelligence.
3. Compare and contrast the dominant data mining algorithms.
4. Design data mining and data warehousing systems and solutions to meet user requirements.

### Module I

Definition Data Mining, Data Mining- on the kind of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining.

### Module II

Data Warehouse and OLAP Technology: Introduction to Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, and from Data Warehouse to Data Mining.

### Module III

Data Preprocessing: Reason behind preprocess the data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

### Module IV

Concept Description: Definition, Data Generalization and Summarization – Based Characterization, Analytical Characterization, Mining Class Comparisons, Mining Descriptive Statistical Measures in Large Databases, Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases.

### References:

1. Han, J., & Kamber, M. (2006). Data mining concepts and techniques (2nd ed.). Elsevier.
2. Elayidom, S.M. (2015). Data Mining and Warehousing, Cengage Learning India.
3. Berson, A., & Smith, S. (1997). Data warehousing, data mining, and OLAP. McGraw-Hill.
4. Dunham, M. (2003). Data mining introductory and advanced topics. Prentice Hall/Pearson Education. Upper Saddle River, N.J.
5. Adriaans, P., & Zantinge, D. (1998). Data mining. Addison-Wesley.
6. Tan, P., & Steinbach, M. (2006). Introduction to data mining. Pearson Addison Wesley.
7. Sinha, A. (2001). Data warehousing. Prompt Publications.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT15-1705 E5. HUMAN COMPUTER INTERACTION

### Course Objectives:

1. Understanding of principles, and theories influencing human computer interaction. Also come across the requirements and specifications for the design of human computer interaction systems.

### Course Outcomes:

On completion of this course the student will be able to

1. Explain the human components functions regarding interaction with computer.
2. Explain Computer components functions regarding interaction with human.
3. Learn Interaction design basics.
4. Get a basic knowledge to design and develop a HCL systems for modern ICT systems.

### Module I

MODELS, THEORIES, AND FRAMEWORKS: On the Effective use and Reuse of HCI, Knowledge Macrotheory for Systems of Interactors, Design of MoRAS, Distributed Cognition: Toward a New Foundation for Human- Computer Interaction Research

### Module II

USABILITY ENGINEERING METHODS AND CONCEPTS: The Strategic Use of Complex Computer Systems, User Interface Evaluation: How Cognitive Models can Help, HCI in the Global Knowledge – Based Economy: Designing to Support Worker Adaptation, A Reference Task Agenda for HCI, The Maturation of HCI: Moving Beyond Usability Toward Holistic Interaction

### Module III

USER INTERFACE SOFTWARE AND TOOLS: Past, Present, and Future of User Interface Software Tools ,Creating Creativity: User Interfaces for Supporting Innovation ,Interaction Spaces for Twenty – First – Century Computing

### Module IV

GROUPWARE AND COOPERATIVE ACTIVITY: Computer – Mediated Communications for Group Support: Past and Future, Intellectual Challenge of CSCW: The Gap Between Social Requirements and Technical Feasibility, Social Translucence: Designing Systems That Support Social processes, Transcending the Individual Human Mind: Creating Shared Understanding through Collaborative Design, The Development of Cooperation : Five Years of Participatory Design in the Virtual School, Distance Matters .

### References:

1. John M Carroll (2001). Human Computer Interaction. Pearson
2. Alan Dix, Janet Finlay. (2004). Human Computer Interaction. Prentice Hall Pearson
3. Ben Schneiderman. (2009). Designing user interface. 5 edition. Pearson.
4. Kevin Mullet, Darrell Sano. (1994) Designing visual user interface: Communication oriented techniques. 1st edition. Prentice Hall.
5. Jacob Nielson. (1994). Usability Engineering. Morgan Kaufmann Publishers

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module

## IT 15-1804 E1. SOCIAL COMPUTING

### Course Objectives:

1. Social computing is interactive and collaborative behavior between computer users. Main objective of this course is to introduce the fundamental concepts and computational techniques used in social computing.
2. Get an essential understanding of social computing within the field of information science and technology.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn the concepts of computational models underlying social computing.
2. Learn the social learning aspects of knowledge management, agents and social interaction.
3. Learn the security and identity in cyberspace.
4. Learn the services provided by social networks.

### Module I

Social Influence and Human Interaction with Technology, Social and Human Elements of Information Security: A Case Study, Computer –Mediated Communication Learning Environments, Online Communities and Social Networking, IT and the Social Construction of Knowledge.

### Module II

Social Learning Aspects of Knowledge Management, Agents and Social Interaction: Insights from Social Psychology – Social Perception, Agent-Based Modelling and Social Psychological Theory.

### Module III

Cyber-identities and Social Life in Cyberspace, Online Learning, Social Presence, Social Networking- Social Networking Analysis, Social Networking Services. Social Networks in information Systems: Tools and Services.

### Module IV

Mobile Social Networks and Services, Social Software, Self-Organization in Social Software for Learning, Mailing Lists and Social Semantic Web.

### References:

1. Dasgupta, S. (2010). Social computing concepts, methodologies, tools and applications. Information Science Reference.
2. H Liu, H., Salerno, J., & Young, M. (2010). Social computing, behavioral modeling, and prediction. Springer.
3. Kamal, R. (2012). Mobile computing (2nd ed.). Oxford University Press.
4. Talukder, A., & Yavagal, R. (2007). Mobile computing: Technology, applications, and service creation. McGraw Hill.

### Note:

#### Continuous assessment:

*I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)*

*II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)*

*Assignments – Maximum marks: 10*

*Attendance – Maximum marks: 5*

#### End semester evaluation

*Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.*

#### *PART A (10 x 2 = 20 marks)*

*Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules*

#### *PART B (4 x 10 = 40 marks)*

*Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I*

*Question nos. IV, V with sub sections (a), (b) ----(10 marks each with options to answer either IV or V) from Module II*

*Question nos. VI, VII with sub sections (a), (b) ----(10 marks each with options to answer either VI or VII) from Module III*

*Question nos. VIII, IX with sub sections (a), (b) ----(10 marks each with options to answer either VIII or IX) from Module IV*

## IT15-1804 E2. SERVICE ORIENTED ARCHITECTURE

### Course Objectives

1. To provide fundamental concepts of Service Oriented Architecture..
2. To gain knowledge about SOAP, UDDI and XML to create web services.
3. To know about the Cloud Computing architecture and services.

### Course Outcomes:

On completion of this course the student will be able to

1. Design, develop and test Web services.
2. Learn standards related to Web services: Web Services Description Language (WSDL)
3. Learn basic principles of Service-Oriented Architecture and apply these concepts to develop a sample application
4. Learn and evaluate emerging and proposed standards for the main components of Web services architecture.

### Module I

#### SOA BASICS

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation – Service Layers.

### Module II

#### XML AND WEB SERVICES

XML structure – Elements – Creating Well-formed XML - Name Spaces – Schema Elements, Types, Attributes – XSL Transformations – Parser –Web Services Overview – Architecture.

### Module III

#### WSDL, SOAP and UDDI

WSDL - Overview Of SOAP – HTTP – XML-RPC – SOAP: Protocol – Message Structure – Intermediaries – Actors – Design Patterns And Faults – SOAP With Attachments – UDDI.

### Module IV

#### SOA in J2EE and .NET

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC) – JAX-RS SOA support in .NET – ASP.NET web services.

### References:

1. Erl, T. (2006). Service-oriented architecture: Concepts, technology, and design. Pearson Education.
2. Bieberstein, N., Bose, S., Fiammante, M., Jones, K., & Shah, R. (2006). Service-oriented architecture compass business value, planning, and enterprise roadmap. IBM Press.
3. Carter, S. (2007). The new language of business: SOA & Web 2.0. IBM Press/Pearson.
4. Erl, T. (2004). Service-oriented architecture: A field guide to integrating XML and Web services. Prentice Hall Professional Technical Reference.
5. Chappell, D. (2004). Enterprise service bus. O'Reilly.
6. Weerawarana, S., Curbera, F., Leymann, F., Storey, T., & Ferguson, D. (2005). Web services platform architecture: SOAP, WSDL, WS-Policy, WS-Addressing, WS-BPEL, WS-Reliable Messaging, and more. Prentice Hall PTR.
7. Newcomer, E., & Lomow, G. (2005). Understanding SOA with Web services. Addison-Wesley.

### Note: Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT15-1804 E3. RECOMMENDER SYSTEM

### Course Objectives:

1. An overview of approaches to developing state-of-the-art recommender systems that automate a variety of choice-making strategies with the goal of providing affordable, personal, and high-quality recommendations.

### Course Outcomes:

On completion of this course the student will be able to

1. Design an alternative ways to organize existing systems .
2. Aggregate information and used to select, filter, or sort items.
3. Learn different recommendation approaches
4. Evaluate a recommender system

### Module I

Introduction to basic concepts: Predictions and Recommendations, Scales and Normalization.

Collaborative recommendation: user -based nearest neighbor recommendation, item-based nearest neighbor recommendation, model-based and preprocessing-based approach

### Module II

Content-Based Recommendation: content representation and content similarity, similarity –based retrieval, other text classification methods.

Knowledge-based recommendation: Knowledge representation and reasoning, Interacting with constraint-based recommenders, Interacting with case-based recommenders.

### Module III

Hybrid recommendation approaches: Opportunities for hybridization, Monolithic hybridization design, Parallelized hybridization design, Pipelined hybridization design.

Explanations in recommender systems: Explanations in constraint-based recommenders, Explanations in case-based recommenders, Explanations in collaborative filtering recommenders.

### Module IV

Evaluating recommender systems: General properties of evaluation research, Popular evaluation designs, Evaluation on historical datasets.

Case study: Personalized game recommendations on the mobile Internet.

### References:

1. Jannach, D., & Zanker, M. (2010). Recommender Systems an Introduction. Cambridge University Press. Leiden.
2. Bhasker, B., & Srikumar, K. (2010). Recommender Systems In E-Commerce. Tata McGraw Hill Education Pvt.
3. Santos, O., & Boticario, J. (2011). Educational recommender systems and technologies practices and challenges. IGI Global, USA.
4. Robillard, M., Maalej, W., & Walker, R. (2014). Recommendation systems in software engineering. Springer.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT15-1804 E4 RANDOMIZED ALGORITHMS

### Course Objectives;

1. Understand the tools and techniques required to design randomized algorithms.

### Course Outcomes:

On completion of this course the student will be able to

1. Learn about randomized algorithms.
2. Cover: moments and deviations; randomized graph algorithms; Chernoff bounds and their applications; randomized data structures; hashing; martingales; the probabilistic method; Markov chains and random walks
3. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs
4. Learn to apply randomized algorithms to graph theory.

### Module I

Tools and Techniques: Introduction: Min-cut algorithm, Binary Planar partitions, Probabilistic Recurrence, Computation Model and Complexity

Game-theoretic techniques: Game tree evaluation, Minimax principle, randomness and non-uniformity

### Module II

Moments and deviations: Occupancy problems, Markov and Chebyshev inequalities, Randomized selection, two-point sampling, Stable marriage problem, coupon collector's problem

Tail inequalities: Chernoff bound, Routing in parallel computer

### Module III

The probabilistic method: maximum stability, expanding graphs, Lovasz Local Lemma, Conditional probabilities

Markov chains and random walks: Markov chains, Random walk in graphs, graph connectivity, expanders and rapidly mixing random walks

### Module IV

Applications: Data structures: Heaps

Graph algorithm: all pairs shortest paths, min-cut problem, minimum spanning trees

### References:

1. Motwani, R., & Raghavan, P. (1995). Randomized algorithms. Cambridge University Press.
2. Mitzenmacher, M., & Upfal, E. (2005). Probability and computing: Randomized algorithms and probabilistic analysis. Cambridge University Press.
3. Hromkovic, J. (2005). Design and analysis of randomized algorithms introduction to design paradigms. Berlin: Springer.
4. Cormen, T., & Leiserson, C. (2009). Introduction to algorithms (3rd ed.). Mit Press. Cambridge (Inglaterra)
5. Granichin, O., & Volkovich, Z. (2014). Randomized algorithms in automatic control and data mining. Springer.

### Note:

#### Continuous assessment:

I Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

II Periodical Test – Maximum marks: 12.5 ( 2 hours for 40 marks)

Assignments – Maximum marks: 10

Attendance – Maximum marks: 5

#### End semester evaluation

Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration for 60 marks.

#### PART A (10 x 2 = 20 marks)

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules

#### PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV

## IT15-1804 E5. BIO COMPUTING

### Course Objectives:

1. Brief introduction to relate biology with computational aspects.

### Course Outcomes:

On completion of this course the student will be able to

1. Get an overview of computational problems in the emerging areas of Bioinformatics, Computational Biology, Genomics and software tools.
2. Learn the key methods and tools used in bio computing
3. Explain various techniques involved in RNA structure prediction, microarray, protein structure prediction
4. Explain the Gene structure in Prokaryotes and Eukaryotes.

### Module I

Basic Concepts of Molecular Biology: Cells - Chromosomes, DNA, RNA, Proteins, Central dogma of molecular biology, Genomes and Genes - Genetic code, Transcription, Translation and Protein synthesis. Web based genomic and proteomic data bases: NCBI, Gene Bank

### Module II

Sequence alignments – Dot plot-Pair-wise sequence alignments - local and global - Sequence similarity and distance measures - Smith-Waterman algorithm, Needleman- Wunsch algorithm, Multiple sequence alignment –Sum-of-Pairs measure - Star and tree alignments – PAM and BLOSUM, Phylogenetic analysis

### Module III

Informational view of Genomic data, Genomic Signal Processing, DNA Spectrograms, Identification of protein coding regions, Gene expression, Microarrays, Microarray image analysis

### Module IV

Gene structure in Prokaryotes and Eukaryotes: Molecular Structure Prediction: Basic concepts and terminologies related to molecular structures, Basic molecular Visualization, RNA secondary structure prediction, Protein folding problem, Protein Threading, Protein Visualization, and Introduction to Drug Discovery.

Case Study: Software Tools: Use of Tools for basic and specialized sequence processing such as: BLAST, FASTA, RasMol, Phylip, ClustalW

### References:

1. Setubal, J., & Meidanis, J. (2003). Introduction to computational molecular biology. PWS Pub.
2. Claverie, J., & Notredame C (2003). Bioinformatics - A Beginners Guide. John Wiley & Sons.
3. Lesk, A. (2003). Introduction to bioinformatics. Oxford University Press.
4. Higgins, D. (2000). Bioinformatics sequence, structure, and databanks : A practical approach. Oxford University Press.
5. Bergeron, B. (2003). Bioinformatics computing. Prentice Hall/Professional Technical Reference.

### Note: Continuous assessment:

1. I Periodical Test – Maximum marks: 12.5

2. II Periodical Test – Maximum marks: 12.5

3. Assignments – Maximum marks: 10

4. Attendance – Maximum marks: 5

5. Type of Questions for End Semester Exam. End Semester Examination will be of 3 hours duration.

Question No. I (a) to (j) – Ten short answer questions of 2 marks each with at least two questions from each of the four modules (10 x 2 = 20 marks)

PART B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- (10 marks each with options to answer either II or III) from Module I

Question nos. IV, V with sub sections (a), (b) ---- (10 marks each with options to answer either IV or V) from Module II

Question nos. VI, VII with sub sections (a), (b) ---- (10 marks each with options to answer either VI or VII) from Module III

Question nos. VIII, IX with sub sections (a), (b) ---- (10 marks each with options to answer either VIII or IX) from Module IV