Appendix - III

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHEME
AND
SYLLABUS

III to VIII Semester

B.TECH
COMPUTER SCIENCE AND ENGINEERING
(2015 Admissions onwards)

B.TECH. DEGREE COURSE IN
COMPUTER SCIENCE & ENGINEERING

Scheme of Examination (2015 Admission)

SEMESTER I [Stream B]

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/Wk	C	Marks		Total
						CA	ESE	
GE15-1101B	Computer Programming	3	1	0	3	40	60	100
AS15-1102B	Engineering Chemistry	3	1	0	3	40	60	100
GE15-1103B	Engineering Graphics	2	1	3	5	40	60	100
GE15-1104B	Basic Electrical Engineering	3	0	0	3	40	60	100
GE15-1105B	Basic Electronics Engineering	3	0	0	3	40	60	100
AS15-1106B	Environmental Studies	3	1	0	3	40	60	100
GE15-11L1B	Electrical Engineering Workshop	0	0	3	1	25	25	50
GE15-11L2B	Computer Programming Laboratory	0	0	3	1	25	25	50
	TOTAL	**17**	**4**	**9**	**22**			

CA – Continuous Assessment, ESE – End Semester Examination

SEMESTER II [Stream B]

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/Wk	C	Marks		Total
						CA	ESE	
AS15-1201B	Calculus	3	1	0	3	40	60	100
AS15-1202B	Engineering Physics	3	1	0	3	40	60	100
GE15-1203B	Engineering Mechanics	4	1	0	4	40	60	100
GE15-1204B	Basic Civil Engineering	3	0	0	3	40	60	100
GE15-1205B	Basic Mechanical Engineering	3	0	0	3	40	60	100
HS15-1206B	Technical Communication and Professional Ethics	2	1	0	2	40	60	100
GE15-12L1B	Civil Engineering Workshop	0	0	3	1	25	25	50
GE15-12L2B	Mechanical Engineering Workshop	0	0	3	1	25	25	50
HS15-12L3B	Language Lab	0	0	1	1	25	25	50
HS15-12L4B	NSS / Nature conservation	0	0	1	1	50	-	50
	TOTAL	**18**	**4**	**8**	**22**			

SEMESTER III

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/Wk	C	Marks		Total
						CA	ESE	
AS15-1301*	Linear Algebra and Transform Techniques	3	1	0	3	40	60	100
CS15-1302	Logic Design	3	1	0	3	40	60	100
CS15/ IT15-1303	Discrete Computational Structures	3	1	0	3	40	60	100
CS15/ IT15-1304	Object Oriented Programming	3	1	0	3	40	60	100
CS15-1305	Principles of Programming Languages	3	1	0	3	40	60	100
CS15-1306	Data and Computer Communication	3	1	0	3	40	60	100
CS15-13L1	Digital Electronics Laboratory	0	0	3	2	25	25	50
CS15/ IT15-13L2	Object Oriented Programming Laboratory	0	0	3	2	25	25	50
	TOTAL	**18**	**6**	**6**	**22**			

*** Common for CE/CS/EC/EE/IT/ME/SE**

SEMESTER IV

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/Wk	C	Marks		Total
						CA	ESE	
AS15-1401*	Complex Variables and Partial Differential Equations	3	1	0	3	40	60	100
CS15-1402	Microprocessors	3	1	0	3	40	60	100
CS15-1403	Computer Architecture and Organization	3	1	0	3	40	60	100
CS15-1404	Automata Languages and Computations	3	1	0	3	40	60	100
CS15/ IT15-1405	Data Structures and Algorithms	3	1	0	3	40	60	100
CS15/ IT15-1406	Database Management Systems	3	1	0	3	40	60	100
CS15-14L1	Database Management Systems Laboratory	0	0	3	2	25	25	50
CS15/ IT15-14L2	Data Structures Laboratory	0	0	3	2	25	25	50
	TOTAL	**18**	**6**	**6**	**22**			

*** Common for CE/CS/EC/EE/IT/ME/SE**

SEMESTER V

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/Wk	C	Marks		Total
						CA	ESE	
AS15-1501*	Numerical and Statistical Methods	3	1	0	3	40	60	100
CS15-1502	System Programming	3	1	0	3	40	60	100
CS15-1503	Object Oriented Software Engineering	3	1	0	3	40	60	100
CS15/ IT15-1504	Operating System	3	1	0	3	40	60	100
CS15-1505	Advanced Microprocessors and Microcontrollers	3	1	0	3	40	60	100
CS15-1506	Computer Graphics	3	1	0	3	40	60	100
CS15-15L1	Computer Graphics Laboratory	0	0	3	2	25	25	50
CS15-15L2	Microprocessors Laboratory	0	0	3	2	25	25	50
	TOTAL	**18**	**6**	**6**	**22**			

*** Common for CE/CS/EC/EE/IT/ME/SE**

SEMESTER VI

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/Wk	C	Marks		Total
						CA	ESE	
CS15-1601	Computer Networks	3	1	0	3	40	60	100
CS15/ IT15-1602	Compiler Construction	3	1	0	3	40	60	100
CS15-1603	Cryptography and Network Security	3	1	0	3	40	60	100
CS15-1604	Data Mining	3	1	0	3	40	60	100
CS15-1605	Embedded System Design	3	1	0	3	40	60	100
CS15-1606	Elective I	3	1	0	3	40	60	100
CS15-16L1	Operating System Laboratory	0	0	3	2	25	25	50
CS15-16L2	Mini Project	0	0	3	2	50	-	50
	TOTAL	**18**	**6**	**6**	**22**			

Elective I:
CS15-1606 E1 Ethical Hacking and Computer Forensics
CS15-1606 E2 System Modeling and Simulations
CS15-1606 E3 Computational Linguistics
CS15-1606 E4 Bioinformatics
CS15-1606 E5 Digital Image Processing

SEMESTER VII

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/Wk	C	Marks		Total
						CA	ESE	
GE15-1701*	Principles of Management	3	1	0	3	40	60	100
CS15-1702	Advanced Computer Networks	3	1	0	3	40	60	100
CS15-1703	Analysis and Design of Algorithms	3	1	0	3	40	60	100
CS15-1704	Web Technologies	3	1	0	3	40	60	100
CS15-1705	Elective II	3	1	0	3	40	60	100
CS15-17L1	Language Processors Laboratory	0	0	3	2	25	25	50
CS15-17L2	Networks Laboratory	0	0	3	2	25	25	50
GE15-17L3	Entrepreneurship Development	0	0	2	1	50	-	50
CS15-17L4	Project Phase I and Industrial Internship**	0	0	2	2	50	-	50
	TOTAL	**15**	**5**	**10**	**22**			

* CS/EC/EE/IT

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

Elective II:

CS15-1705 E1 Software Project Management
CS15-1705 E2 Artificial Neural Networks
CS15-1705 E3 High Performance Embedded Computing
CS15-1705 E4 Advanced Mobile Communications
CS15-1705 E5 Network Programming

SEMESTER VIII

Code No.	Subject	L Hrs/Wk	T Hrs/Wk	P/D Hrs/Wk	C	Marks		Total
						CA	ESE	
CS15-1801	Advanced Architecture and Parallel Processing	3	1	0	3	40	60	100
CS15-1802	Artificial Intelligence	3	1	0	3	40	60	100
CS15-1803	Distributed Computing	3	1	0	3	40	60	100
CS15-1804	Elective III	3	1	0	3	40	60	100
CS15-18L1	Seminar	0	0	3	2	50	-	50
CS15-18L2	Project Phase II	0	0	11	6	200	-	200
CS15-18L3	Comprehensive Viva Voce	0	0	0	2	-	50	50
	TOTAL	**12**	**4**	**14**	**22**			

Elective III:

CS15-1804 E1 Software Testing
CS15-1804 E2 Big Data Analytics
CS15-1804 E3 Cloud Computing
CS15-1804 E4 Agent Based Intelligent Systems
CS15-1804 E5 Real Time Systems

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, seies 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 nth 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, 10th edition, Wiley, 2011.
3. T. Veerarajan, Engineering Mathematics, 3rd Edition, Tata McGraw Hill Publishers, 2011
4. B.S.Grewal, Higher Engineering Mathematics, 43rd 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, 2nd 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, Debobrata 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 & Distributers, 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- Co-ordination 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 super conductors.Types of superconductors-type 1 and type 2- AC Josephsons effect- DC Jospehsons 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 Shrodinger equation for a free particle-Particle in force field and time dependent Schrodinger equation-Time independent schrodinger equation-Physical intrepretation 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 - Accoustics of building-reverberation- Absorption Coefficient- Sabines formula for reverberation time(Derivation)-Accoustic 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, 5th 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, 2nd Edition, Ane Books Pvt. Ltd., 2011.
5. R Gopalan, D Venkappayya, Sulochana Nagarajan, Textbook of Engineering Chemistry, 2nd 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'Alemberts 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, 3rd Edition, Vikas Publishing House Pvt. Ltd.,2010.
5. Hibbeller, R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, 12th 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, 49th 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, 41st Edition, Charotar Publishing House, Anand, 2014.
2. Surendra Singh, Building Materials, Vikas Publishing Company, New Delhi, 1996.
3. S.C. Rangawala, Building Construction, 32nd 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, 12th Edition, Pearson Education, 2012.
2. H. Cotton, Electrical Technology, 7th 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, 2nd 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-plank and Claussius 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, Carburatted 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, arec 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, 3rd 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, 7th 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, 5th 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. Inida as a mega-diversity nation. Hot-sports 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.

Diaster 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 rahabilitation 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, 3rd 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, 2nd 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 Mc-GraHill,2000.
5. William Sanborn Pfeiffer, T.V.S. Padmaja, Technical Communication – A Practical Approach,
Pearson, 2007.
6. R.C. Bhatia, Business Communication, 2nd 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.

AS15-1301 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 the 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 Erwin Kreyzig, Advanced Engineering Mathematics, 10^{th} Edition, Wiley, 2011.

2 Grewal, B. S., Higher Engineering Mathematics, 43th Edition, Khanna Publishers, 2013.
3 Hsiung, C.Y. and Mao, G.Y.- Linear Algebra, WorldScientfic
4 Hoffman, K. and Kunze, R., Linear Algebra, Prentice Hall of India ,New Delhi 1971.
5 Venkataraman, M. K., Linear Algebra, The National Co., 1999.

Type of Questions for End Semester Exam

PART A

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

CS15-1302 LOGIC DESIGN

Course Objectives

To study various number systems and to simplify mathematical expressions using Boolean functions
To study the implementation of combinational circuits
To study about the design of various synchronous and asynchronous circuits

Course Outcomes

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

1. Get in-depth knowledge about various number systems and codes used in digital circuits
2. Minimize a given expression and design a circuit to implement it
3. Design logic circuits and implement any given function in a simplified way
4. Familiarize with various memory devices

Module-I

Introduction: Digital System - Binary Numbers - Base conversions - Octal and Hexadecimal numbers - Compliments - Signed binary numbers - Binary codes - Binary Logic. 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: Karnaugh map - two, three, four and five variable maps - POS simplification - Don't care conditions - NAND and NOR implementation - Exclusive OR function - Quine Mc Cluskey Technique.

Module-II

Combinational Logic : Combinational Circuits - Analysis procedure - Design procedure - Binary adder - Subtractor - Fast adders - Decimal adder - Magnitude comparator - Decoders - Encoders - Multiplexers and Demultiplexers.

Module-III

Synchronous sequential circuits: Sequential circuits - Latches and Flip Flop - Analysis of clocked sequential circuits - State reduction and analysis - Design procedure. Registers and Counters: Registers - Shift Registers - Ripple counters - Synchronous counters - Counter with unused states - Ring counter - Johnson counter.

Module-IV

Memory and Programmable Logic: Random Access Memory - Memory decoding - Error detection and correction - Read Only Memory - Programmable Logic Array - Programmable Array Logic - Sequential programmable devices. Asynchronous Sequential circuits: Analysis procedure - Circuits with Latches - Hazards.

Digital Integrated circuit: IC digital logic families - Characteristics:- Fan out - Power dissipation-

Propagation delay - Noise Margin. RTL and DTL circuits - Transistor Transistor Logic - Emitter coupled Logic - CMOS Logic - CMOS transmission gate circuit.

References

1 Morris Mano, M., Michael D. Ciletti, Digital Design, 5th edition, Pearson Education, 2013, ISBN-13: 978-0-13-277420-8.

2 Morris Mano,M., Digital Logic and Computer Design, 1st edition, Pearson Education, 2008, ISBN: 978-81-775-8409-7

3. John M. Yarbrough, Digital Logic - Applications And Design , Thomson Learning, 2002, ISBN: 981-240-062-1

4. Herbert Taub, Donald Schilling, Digital Integrated Electronics, 1st edition, Tata Mcgraw Hill, 2010. ISBN: 978-00- 702-6508-0.

5. David A. Hodges, Horace G. Jackson and Resve A. Saeh, Analysis and Design of Digital Integrated Circuits, 3rd edition, Tata McGraw Hill, 2008. ISBN-13: 978-0-07-059375-6.

6. Thomas L. Floyd, Digital Fundamentals, 10th edition, Pearson Education , 2011, ISBN: 978-81-317-3448-3

Type of Questions for End Semester Exam

PART A

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

CS15/IT15-1303 DISCRETE COMPUTATIONAL STRUCTURES

Course Objectives

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

Course Outcomes

On completion of the 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, homomorphisms, rings, fields. Posets, Hasse Diagrams, Lattice: Bounded Lattice - Sublattice - Distributive Lattice - Isomorphic Lattice.

References

1. Rosen, K.H., Discrete Mathematics and its Applications, McGraw-Hill, 7th Edition, 2011
2. Veerarajan, T., Discrete Mathematics with Graph Theory and Combinatorics, McGraw-Hill Education
3 Ralph P. Grimaldi, Discrete and Combinatorial Mathematics: An applied introduction, Pearson Education Limited, 2014 ISBN 10 : 1-292-02279-5
4 Satinder Bal Gupta, Discrete Mathematics and Structures, University science Press (Laxmi Publications (P) Ltd.) ISBN : 978 – 81 – 318 – 0452 – 0, 5th Edition

Type of Questions for End Semester Exam

PART A

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

CS15/IT15-1304 OBJECT ORIENTED PROGRAMMING

Course Objectives

To understand clearly the difference between object oriented programming and procedural programming

To learn and apply advanced C++ features such as function overloading, operator overloading, inheritance, virtual functions etc in programs

To build C++ classes using appropriate encapsulation and other design principles

Course Outcomes

On completion of the 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., Object Oriented Programming with C++, 6th Edition, Tata McGraw Hill, ISBN: 978-1-25-902993-6
2. Robert Lafore, Object Oriented Programming in Turbo C++, 4th Edition, Galgotia, ISBN-13: 978-0672323089
3. Ashok N. Kamthane, Object oriented programming with ANSI & Turbo C++, 2/ E , Pearson Publications, ISBN: 9788131703830.
4. Ravichandran, D., Programming with C++, 2003, Tata McGraw Hill
5. Bjarne Stroustrup, The C++ Programming Language, 4th Edition, Addison Wesley. ISBN-13: 978-0321563842
6. Herbert Schildt, The Complete Reference to C++ Language, McGraw Hill-Osborne.

Type of Questions for End Semester Exam

PART A

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

CS15-1305 PRINCIPLES OF PROGRAMMING LANGUAGES

Course Objectives

To understand the evaluation criteria of programming languages
To introduce and compare the major programming paradigms - imperative, object oriented , functional and logical programming
To understand the syntax and semantics of programming languages
To learn the concepts of different programming paradigms

Course Outcomes

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

1. Understand the concepts of imperative, object oriented, functional,and logic programming languages
2. Improve their ability to learn new programming languages
3. Express programming concepts and choose among alternative ways to express things
4. Understand the design issues involved in various constructs of programming languages

Module-I

Programming domains, Language Evaluation Programming paradigms - Imperative programming, Functional programming, Object oriented programming, Logic programming. Formal methods of describing syntax and semantics - Backus Naur Form, Attribute grammars. Describing semantics - Denotational semantics.

Module-II

Data types, Names, Variables, Bindings, Scope and lifetime, Referencing Environments-Named Constants-Variable Initialization-Subprograms-Parameter Passing - Coroutines.

Module-III

Data abstraction and encapsulation. Polymorphism and inheritance. Features of object-oriented languages - Smalltalk, C++ and Java. Design and implementation issues. Exception handling.

Module-IV

Functional programming languages - Lambda calculus - Introduction to pure LISP. Application of functional programming languages. Logic programming languages - a brief introduction to predicate calculus – Horn clauses - Logic programming. Introduction to Prolog. Applications of Logic programming.

References

1. Robert W. Sebesta, Concepts of Programming Languages, 8th Edition, Addison Wesely
2. Ravi Sethi, Programming Languages - concepts and constructs, 2nd Edition, Addison Wesely, ISBN: 81- 7758-422-7.
3. Michael L. Scott, Programming Language Pragmatics – 3rd Edition, Morgan Kaufmann
4. Kenneth C. Louden, Programming Languages : Principles and Practices, 2nd Edition, Thomson Learning.
5. Terence W. Pratt, Programming Languages, 4th Edition, Prentice Hall
6. Bjarn Stroustrup, Design and Evolution of C++, Addison Wesley
7. Ken Arhold, James Gosling and David Holmes Java Programming Language, 4th Edition, Addison Wesley,
8. Allen B. Tucker, Robert E. Noonan, Programming Languages Principles and Paradigms, 2nd Edition, Tata McGraw Hill.
9. Ramesh Vasappanavara, Anand Vasappanavara, GautamVasappanavara, Object Oriented Programming Using C++ and Java, Pearson, ISBN: 978-81-317-5455-9.

Type of Questions for End Semester Exam.

PART A

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

CS15-1306 DATA AND COMPUTER COMMUNICATION

Course Objectives

To provide basic concepts of data communication, networking and connectivity
To explore about hardware, connectivity, signaling, addressing, network topologies, communication protocols, network designs and switching

Course Outcomes

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

1. Explain the importance of data communication and the Internet in supporting business communication and daily activities.
2. Explain how communication works in data networks and the Internet.
3. Recognize different internetworking devices and their functions.
4. Explain the role of protocols in networking.
5. Analyse the services and features of the various communication devices.

Module-I

Introduction to Data Communications and Computer Networks, The Internet, Protocols and Standards, Network Models, Layered Tasks, The OSI Model, Layers in the OSI Model, Addressing. Data and Signals: Analog and Digital, Periodic Analog Signals, Digital Signals, Noise, Transmission impairments, Data Rate Limits - Nyquist's and Shannon's capacity equations, Performance, Digital Transmission: Digital data over Digital channel, Analog data over Digital channel, Analog Transmission: Analog data over Analog channel, Digital data over Analog channel.

Module-II

Bandwidth utilization: Multiplexing and Spreading, Multiplexing, Spread Spectrum, Transmission Media: Guided Media, Unguided Media: Wireless, Switching, Circuit - Switched Networks, Datagram Networks, Virtual - Circuit Networks, Structure of a Switch, Using Telephone and Cable Networks for Data Transmission, Telephone Networks, Dial-up Modems and modem standards, Digital Subscriber Line - different DSL technologies, Cable TV Networks, Cable TV for Data Transfer

Module-III

Error Detection and Correction: Block Coding, Linear Block Codes, Hamming distance, Cyclic Codes, Checksum – CRC - capabilities of CRC, FEC: Hamming code, constant ratio code, convolutional code. Error and flow control methods: ARQ implementations - Stop and wait, Go-back-n, Selective repeat.

Data Compression: Simple coding schemes, Frequency based coding - Huffman coding, Relative encoding, Run length encoding, LZW compression - Image and video compression standards.

Module-IV

Network Topologies - Mesh, Star, Tree, Ring, Bus, Hybrid. Connecting devices: Passive hubs, Repeaters, Active hubs, Bridges, Two layer and Three layer switches, Routers, Gateway.
IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet, IEEE 802.11, Bluetooth.

References

1. Behrouz A. Forouzan, Data Communication and Networking, 4th Edition, McGraw Hill, 2006. ISBN: 978-0-07-06-3414-5
2. William Stallings, Data and Computer Communication, 9th Edition, Pearson education, 2006. ISBN: 978-0- 13-139205-2
3. Fred Halsal, Data Communication Computer Network and Open Systems, 4th Edition, Pearson education, 2005
4. William Stalling, Wireless Communication and Networks, 2nd Edition, Pearson Education, 2004ISBN: 978-0-13-191835-1
5. William A. Shay, Understanding Data Communication & Networks, 2nd Edition, Thomson Learning, 2003, ISBN: 978-0-53-420244-6
6. Achyut S. Godbole, Atul Kahate, Data Communications and Networks, New Delhi, Tata McGraw Hill Publishing Company Ltd., 2nd Edition, 2004

Type of Questions for End Semester Exam

PART A
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

CS15-13L1 DIGITAL ELECTRONICS LABORATORY

Course Objectives

To impart the concepts of digital electronics practically and train the students with all the equipment which will improve their basic knowledge.

Course Outcomes

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

1. Gain good knowledge about the concepts of digital electronics
2. Apply these concepts in practical cases.

1	Study of standard logic gates and universal gates.
2	Arithmetic circuits i. Adders &subtractors using standard logic & universal gates. ii. Study of 7483 & binary addition & subtraction using 1's & 2's complement. iii. BCD adder using 7483.
3	Code converters with mode control, Parity generator/ checkers.
4	Study of MUX, DEMUX, decoder & encoder circuits & their ICs.
5	Flip flops: RS, JK, T, D, master-slave JK flip flops using universal gates.
6	Counters i. Asynchronous UP, DOWN, UP/DOWN counter using JK Flip flops ii. Design and realization of sequence generators. iii. Study of IC counters 7490, 7492, 7493 and 74193.
7	Study of shift registers and design of Johnson and Ring counter using it.
8	Study of seven segment display & decoder driver (7447).
9	Astable and nonstable multi-vibrators using TTL gates.
10	Transfer characteristics and specifications of TTL gates.

References

1. Morris Mano, M., Michael D. Ciletti, Digital Design, 4th Edition, Pearson Education, 2009, ISBN:978-81-317-1450-8
2. Herbert Taub, Donald Schilling, Digital Integrated Electronics, McGraw Hill Education, ISBN: 978-00-702-6508-0
3. Thomas L. Floyd, Digital Fundamentals, 10th Edition, Pearson Education, 2011, ISBN: 978-81-317-3448-3
4. Yarbrough, Digital Logic - Applications And Design, Thomson Learning, ISBN: 981-240-062-1

5. Morris Mano, M., Digital Logic and Computer Design, 1st Edition, Pearson Education, ISBN: 978-81-775-8409-7
6. Anand Kumar, A., Fundamentals of Digital Circuits, PHI Learning, 2nd Edition, 2010, ISBN: 978-81-203-3679-7

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.

CS15 / IT15 - 13L2 OBJECT ORIENTED PROGRAMMING LABORATORY

Course Objectives

To differentiate the programming techniques of structured and OOPS programming
To familiarise with the implementation of various OOPS concepts in C++

Course Outcomes

On completion of the 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

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., Object Oriented Programming with C++, 6th Edition, Tata McGraw Hill., ISBN: 978-1-25-902993-6
2. Robert Lafore, Object Oriented Programming in Turbo C++, 4th Edition, Galgotia, ISBN-13: 978-0672323089
3. Bjarne Stroustrup, The C++ Programming Language, 4th Edition, Addison Wesley. ISBN-13: 978-0321563842

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.

AS15-1401 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 the 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. Erwin Kreyzig Advanced Engineering Mathematics, 10th Edition,Wiley, 2011
2. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2013

Type of Questions for End Semester Exam

PART A

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

CS15-1402 MICROPROCESSORS

Course Objectives

To get in-depth knowledge of the architecture and instruction set of typical 8-bit and 16-bit microprocessor.
To study the instruction set and to develop assembly language programs.
To design hardware interface circuits.

Course Outcomes

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

1. Identify the basic elements and functions of microprocessors 8085 and 8086
2. Explain the architecture and operations of microprocessors
3. Learn the design aspects of I/O and Memory Interfacing circuits

Module-I

Introduction to 8 bit microprocessor: Internal architecture of Intel 8085 microprocessor: Block diagram, Registers, Internal Bus Organization, Functional details of pins, Control signals, External Address / Data bus multiplexing, Demultiplexing.

Module-II

8085 instruction set: Instructions, Classifications, Addressing modes, Programming examples, Instruction Timing, I/ O mapped I/ O, and memory mapped I/ O techniques. Interrupts of the 8085 Microprocessor.

Module-III

Introduction to 8086 - 8086 Architecture - Addressing Modes - Instruction Set and Programming, Assembler Directives. 8086 hardware design: minimum mode and maximum mode configurations, Bus structure, bus buffering, latching, system bus timing with diagram, Interrupt of 8086 Microprocessor.

Module-IV

I/O and MEMORY INTERFACING USING 8085 and 8086:
Memory interfacing and I/O interfacing with 8085 and 8086 – Parallel communication interface (8255) – Timer (8253 / 8254) – Keyboard / Display controller (8279) – Interrupt controller (8259) – DMA controller (8257)

References

1. Ramesh S. Gaonkar , Microprocessor – Architecture, Programming and Applications with the 8085 Penram International Publisher , 5th Edition, 2006

2. Cheng Liu and Glenn A. Gibson, Microcomputer Systems: The 8086 / 8088 Family Architecture, Programming and Design, 2nd Edition, PHI, 1995
3. Douglas V. Hall,Microprocessors and Interfacing, Tata McGraw Hill publications, 2nd Edition, 2006.
4. Lyla B. Das, The x86 Microprocessors: 8086 to Pentium, Multicores, Atom and the 8051 Microcontroller, 2nd Edition, Pearson Education. ISBN-13: 978-9332536821.
5. Barry B. Brey, The INTEL Microprocessors – 8086 / 8088, 80186 / 80188, 80286, 80386, 80486 Pentium and Pentium pro processor, Pentium II, Pentium III and Pentium IV – Architecture, Programming and interfacing, PHI , 6th Edition, 2003.
6. Kenneth Ayala, The 8086 Microprocessor: programming and interfacing the PC, Thomson Learning
7. Ray,A. K., Bhurchandi, K.M., Advanced Microprocessor & Peripherals, Tata McGraw Hill, 2nd Edition, 2012
8. Abhishek Yadav, Microprocessor 8085, 8086, ISBN: 978-81-318-0356-1, 1st Edition, 2008

Type of Questions for End Semester Exam

PART A

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

CS15-1403 COMPUTER ARCHITECTURE AND ORGANIZATION

Course Objectives

To get a thorough understanding of the basic structure and operation of a digital computer
To study the operation of the arithmetic unit including algorithms and implementation of fixed - point and floating - point addition, subtraction, multiplication and division
To study the hierarchical memory system including cache memories and virtual memory
To study different ways of communicating with I/O devices and standard I/O interfaces

Course Outcomes

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

1. Familiarise with the history and development of modern computers
2. Familiarise with the Von Neumann architecture
3. Familiarise with the functional units of the processor such as the register file and arithmetic and logic unit
4. Familiarise with the memory system including cache memories and virtual memory
5. Familiarise with assembly level programming, representation of data, addressing modes, instruction sets, etc.
6. Familiarise with the different ways of communicating with I/O devices and standard I/O interfaces

Module-I

Basic structure of computers – Functional units – Basic operational concepts – Bus structures – Software - Historical Perspective. Instructions & instruction sequencing - Addressing modes – Assembly language – Basic Input Output operations - Stacks, Queues & Subroutines.

Module-II

Processing Unit – Fundamental concepts – Execution of a complete instruction - Multiple bus organization - Hardwired control - microprogrammed control - control signals -microinstructions-microprogram sequencing - Branch address modification - Pre-fetching of micro instructions - Emulation. Computer arithmetic - design of 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.

References

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization, 5th Edition, McGraw Hill, 2002, ISBN: 0072320869.
2. Pal Chaudhury, P., Computer Organization and Design, 3rd Edition, PHI Learning, New Delhi, 2009, ISBN: 978-81-203-3511-0.
3. John P. Hayes, Computer Organization and Architecture, 4th Edition, McGraw Hill, 2003, ISBN-13: 978-0072320886.
4. Kai Hwang & Faye A. Briggs, Computer Architecture and Parallel Processing, 1st Edition, McGraw Hill Education, 2012, ISBN-13:9781259029141.
5. David A. Patterson and John L. Hennessy, Computer Organization and Design, The Hardware / Software Interface, 5th Edition, Morgan Kaufmann, 2013, ISBN: 978-0-12-407726-3.

Type of Questions for End Semester Exam

PART A

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

CS15-1404 AUTOMATA LANGUAGES AND COMPUTATIONS

Course Objectives

To apply the concept of Finite Automata in processing text
To write valid regular expressions used for lexical analysis
To design new context free grammars (CFG)
To solve problems using Turing machines

Course Outcomes

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

1. Study the concept of finite state systems and understand their application in compiler design
2. Understand how new programming languages can be developed
3. Implement CFG using Pushdown Automata
4. Understand how various problems solved using digital computers can be simulated mathematically

Module-I

Finite state systems: NFA, DFA, Definitions. Equivalence of NFA and DFA, NFA to DFA conversion, NFA with epsilon transitions, Elimination of epsilon transitions, Minimization of Finite Automata, Finite Automata with output. Designing Moore and Mealy machines

Module-II

Regular Expressions: Definitions, Equivalence of regular expression and finite automata, Conversion between regular expression and DFA, Arden's Theorem, Pumping Lemma of regular languages and its application, closure properties of Regular sets, Applications of regular expressions: Expressions in UNIX, lexical analysis.

Regular grammars: equivalence of regular grammar and FA, converting regular grammar to Finite Automata, Converting Finite Automata to regular grammar

Module-III

Context Free grammars (CFG): Definition, Derivations, parse trees, ambiguity, Simplification of CFG, Conversion to Normal Forms: Chomsky, Greibach. Pumping lemma for Context free languages, application of pumping lemma, Closure Properties of CFL, decision algorithms for CFL.

Pushdown Automata: Definition, Design examples, Equivalence of acceptance by final state and empty stack, Equivalence of PDA and CFG.

Module-IV

Turing machine (TM): Model of TM, Design examples, Techniques for construction of TM: storage in the state, multiple tracks ,subroutines, multi-tape . Church's Thesis, Universal TM Recursive and

recursively enumerable languages, halting problem of TM, Decidable and Undecidable problems. Problem reduction.

Introduction to Linear Bound Automata and Context Sensitive Grammars, Chomsky Hierarchy.

References

1. Hopcroft J. E., Motwani,R. and Ullman J. D., Introduction to Automata Theory, Languages, and Computation, 3rd Edition, ISBN : 978-03-214-5536-9
2. Mishra, K.L.P. and Chandrasekaran, N., Theory of Computer Science, Automata , Languages and Computation, 3rd Edition, PHI, 2014, ISBN 978-81-203-2968-3
3 Peter Linz, An Introduction to Formal Languages and Automata, 4th Edition, Narosa Publishing Co., ISBN 978-81-7319-781-9
4 Sivadandam, S. N., Janaki Meena, M., Theory of Computation, I. K. International Publishing House, 1st Edition, ISBN 978-93-80026-20-6.
5 John.C. Martin, Introduction to Languages and the theory of computation, 3rd Edition, Tata McGraw Hill, ISBN 978-0-07-066048-9
6. Padma Reddy, A.M., Finite Automata and Formal Languages, 1st Edition, Pearson Education, ISBN 978-81-317-6047-5

Type of Questions for End Semester Exam

PART A

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

CS15/IT15-1405 DATA STRUCTURES AND ALGORITHMS

Course Objectives

To identify, understand and determine the usage of various data structures, their design, operations and associated algorithms

To study the basic algorithm techniques for various types of sorting and searching

Course Outcomes

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

1. Master the implementation of linked data structures such as linked lists and binary trees
2. Familiarise with advanced data structures such as balanced search trees, hash tables,spatial data structures etc.
3. Familiarise with several sorting algorithms including quicksort, mergesort and heapsort
4. Familiarise 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. Robert Lafore, Data structures and algorithms in JAVA, 2nd Edition, Pearson, ISBN: 978-8131718124.

2. Adam Drozdek, Data Structures and Algorithms in Java, Thomson Publications, 2nd Edition , ISBN-13: 9780534492526
3. Sartaj Sahni, Data Structures, Algorithms, and Applications in Java, McGraw-Hill
4. Aaron M. Tanenbaum, Moshe J. Augenstein, Yedidyah Langsam, Data Structures using Java, Pearson Education, 2003, ISBN 13: 9780130477217
5. Ellis Horowitz, SartajSahni, Dinesh P. Mehta, Fundamentals of Data Structures in C++, Silicon Press, 2007
6, Clifford A. Shaffer, Data structures and Algorithm analysis in Java, Dover Publications, 2012, ISBN 97804864858127.
7. Kurt Mehlhorn and Peter Sanders, Algorithms and Data Structures. The Basic Toolbox. October 3, 2007. Springer publications
8. Jean Paul Tremblay and Paul G Sorenson, An introduction to Data Structures with Applications, McGraw-Hill, Singapore, 1984

Type of Questions for End Semester Exam

PART A

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

CS/IT15-1406 DATABASE MANAGEMENT SYSTEMS

Course Objectives

To understand different database models and language queries to access databases
To understand effective manipulation of memory space for database files
To understand the normalization in building effective database tables
To protect the data and the database from unauthorized access and manipulation

Course Outcomes

On completion of the 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 and Navathe, Fundamentals of Database Systems, 5th Edition, Addison - Wesley, 2011.
2. Peter Rob Carlos Coronel, Database Systems , Design, Implementation & Management, 5th Edition, Thomson Course Technology
3. Silberschatz, A., Korth, H.F. and Sudarshan, S., Database System Concepts, 4th Edition, Tata McGraw Hill, 2002
4. Thomas Connoly, Carolyn Begg, Database Systems, 3rd Edition, Pearson Education.
5. Date, C.J., An Introduction to Database Systems, Addison –Wesley
6. Margaret H. Dunham, Data Mining - Introductory and advanced topics, Pearson Education, 2003.
7. Hector Garcia - Molina, Jeffret D. Ullman, Jenniffer Widom, Database System implementation, Prentice Hall International, 2000.

Type of Questions for End Semester Exam

PART A

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

CS15-14L1 DATABASE MANAGEMENT SYSTEMS LABORATORY

Course objectives

To understand basic concepts and terminology related to DBMS and related applications
To program simple database applications in MySQL - PHP.
To understand the SQL language and its various constructs

Course Outcomes

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

1. Write queries for design and manipulation of database tables using MySQL.
2. Write simple and complex SQL Queries.
3. Design and develop applications using PHP - MySQL.

1 Application of DDL and DML queries and set operations
2 MySQL and views
3 Cursor
4 Procedures, function and triggers
5 Web application using PHP - MySQL connection
6 Develop a login form with validation against a user table using PHP/MYSQL
7 Develop a search form accessing a user table using PHP/MYSQL

References

1. Seyed, M. M. et.al, Learning MySQL: Get a handle on your data, O'Reilly publishers
2. Robin Nixon, Learning PHP, MySQL and JavaScript, O'Reilly publishers

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.

CS15/IT15-14L2 DATA STRUCTURES LABORATORY

Course Objectives

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

Course Outcomes

On completion of the 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..

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

References

1. Robert Lafore, Data structures and algorithms in JAVA-Second edition, Pearson, ISBN: 978-8131718124.
2. Balaguruswamy, Programming with JAVA, a primer, 4th Edition, Tata McGraw-Hill, ISBN:978-0070141698.

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.

AS15-1501 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 the 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 diffrences. 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, Z-test statistic, Chi square test for variance, for goodness of fit and F-test .

References

1. Erwin Kreyzig, Advanced Engineering Mathematics, 10th Edition, Wiley, 2011
2. Grewal, B.S, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2013
3. Kandaswamy, P., Thilagavathy,K., Gunavathy,K., Numerical methods, S Chand & Co

4. Richard A. Johnson. Irvin Miller and John E. Freund. Probability and statistics for engineers, 8th Edition, Pearson, 2010

Type of Questions for End Semester Exam

PART A

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

CS15-1502 SYSTEM PROGRAMMING

Course Objectives

To study the major tasks of the system software in a computer system
To study the internal working of system software

Course Outcomes

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

1. Understand the basics of system programs like assembler, linker, loader and operating system
2. Describe the concepts of assemblers and macro-processors
3. Understand how linker and loader create an executable program from an object module created by assembler
4. Understand different types of operating systems.

Module-I

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 - Loader functions-program relocatability - absolute and bootstrap loader - Overview of linkage editing - linking loader - Dynamic linking - Design of the linkage editor

Module-III

Macro processors - macro definition and usage - Schematics for Macro expansion - Generation of unique labels - Conditional macro expansion - Recursive macro expansion - Design of a Macro preprocessor - Design of a Macro assembler.

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. Leland L. Beck, System Software - An Introduction to System Programming, 3rd Edition, Addison Wesely
2. John J. Donovan, Systems Programming, McGraw Hill, 2009
3. Dhamdhere D.M., System Programming and Operating Systems, 2nd Edition. Tata McGraw Hill

Type of Questions for End Semester Exam

PART A

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

CS15-1503 OBJECT ORIENTED SOFTWARE ENGINEERING

Course Objectives

To understand various software process / life cycle models
To compare and contrast structured Vs object oriented modeling
To understand various techniques in software quality assurance
To understand various principles of software project management

Course Outcomes

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

1. Develop SRS and other project documents for a software project
2. Understand the various object oriented analysis and design techniques
3. Understand various testing and quality assurance techniques
4. Understand various software project management techniques

Module-I

Software Life Cycle - Waterfall model – Prototyping – Spiral model –Rational unified process - Agile development - pros and cons of each model.
Requirements Analysis - SRS – Introduction to Structured analysis and design techniques - Introduction to Object oriented analysis and design techniques

Module-II

Software Design: Design Heuristics – Cohesion and Coupling
Concepts of user interface design - Architectural design - Use case analysis - Introduction to UML diagrams - case studies - Design frameworks and patterns in object oriented systems

Module-III

Introduction to Software Quality Management - SQA-SQM-SCM-Software Testing - Objectives of testing – Black Box and white box testing – Test Plan - Unit testing – Integration testing – System testing – Test reporting-Testing object oriented programs - Quality standards ISO and CMM - Software quality metrics

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 - Work Breakdown Structure - CASE tools

References

1. Rajib Mal, Fundamentals of Software Engineering, 2nd Edition, PHI
2. Jacobs et.al, Object Oriented Software Engineering: A Use case driven approach, Pearson Education
3. Booch et.al, The UML Reference Manual- Pearson Education.
4. Roger S. Pressman, Software Engineering – 7th illustrated edition, McGraw Hill
5. Pankaj Jalote, Software Engineering – 3rd illustrated Edition, Springer books
6. Milind Limaye, Software Quality assurance – 1st Edition, Tata McGraw Hill
7. Limaye, M.G., Software Testing-Principles, testing and tools – 1st Edition, Tata McGraw Hill
8. Frank Tsui, Managing Software Projects - Illustrated Edition, Jones and Barlett learning
9. David Gustafson, Software Engineering-, 1st Edition, Schaum's outline series
10. Deepak Jain, Software Engineering - Principles and Practices, 1st Edition, Oxford Higher Education Publications
11. Richard Thayer, Software Project Management – 2nd Illustrated Edition, IEEE Computer Society
12. Bruegge, Object Oriented Software Engineering using UML patterns and Java, Pearson Education

Type of Questions for End Semester Exam

PART A

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

CS15/IT15-1504 OPERATING SYSTEM

Course Objectives

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

Course Outcomes

On completion of the 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 systems
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. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, 9th Edition, John Wiley and Sons Inc., 2012. ISBN-13: 978-1118063330.
2. Andrew S. Tanenbaum and Herbert Bos, Modern Operating Systems, 4th Edition, Pearson Education, 2014. ISBN-13: 978-0133591620.
3. William Stallings, Operating Systems Internals and Design Principles, 8th Edition, Pearson Education, 2014. ISBN-13: 978-0133805918.
4. Dhananjay M. Dhamdhere, Operating Systems - A Concept Based Approach, 3rd Edition, Tata McGraw Hill, 2012. ISBN-13: 978-1259005589.
5. Achyut S. Godbole, Atul Kahate, Operating Systems, 3rd Edition, Tata McGraw Hill,2010. ISBN-13: 978-0070702035.
6. Rajib Mall, Real-Time Systems: Theory and Practice, 1st Edition, Pearson Education India, 2009. ISBN-13: 978-8131700693.
7. Jim Cooling, Real-time Operating Systems, 1st Edition, Lindentree Associates, 2013.
8. Morgan, Real-Time Operating Systems, Longman, 1995. ISBN-13: 978-0131258815.

Type of Questions for End Semester Exam

PART A

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

CS15-1505 ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives

To study architecture of 32bit, 64bit and multi core processors.
To study the basics of microarchitectures.
To study architecture of 8051 micro controller
To study the architecture of PIC microcontrollers·

Course Outcomes

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

1. Understand 32bit, 64bit and multi core architectures.
2. Learn the basics of micro architectures.
3. Compare the features of various microprocessors
4. Understand the architecture and programming with 8051 micro controller
5. Understand the basic architecture and features of PIC microcontrollers.

Module-I

Intel 80386 Microprocessor: Architecture - Memory system - I/O System - Registers – Descriptors - Real Mode - Protected mode - Virtual Memory - Paging and Segmentation - Virtual 8086 mode - Comparison with 80486 Microprocessor.

Pentium class of processors: RISC and CISC architectures - Superscalar Architecture - MMX technology –SSE – Pipelining - Branch Prediction techniques – FPU - Comparative study of features of Pentium-II, Pentium-III and Pentium-IV processors.

Module-II

Multi core processors – concept - major issues- Nahelam microarchitecture - SandyBridge and IvyBridge- Fourth and Fifth generation core family - technical features in IA processors - Nanometer Technology- Difference between Core i3, i5 and i7 processors.

Atom SoC-Bonnell microarchitecture - Power reduction techniques in processors - Silvermont microarchitecture - Intel cherry view - cherry trail - introduction to intel skylake microarchitecture

Module-III

8051 microcontroller: Architecture - addressing modes - instruction set – programming - pin configuration

- timers – counters - interrupts- communication interfaces - interfacing with DAC, ADC, stepper motor, hex keyboard and LCD displays.

Module-IV

PIC micro controllers: PIC family - PIC16F84A: architectural – memory – RAM – ROM - instructions-instruction cycle-ports - power supply - oscillator

PIC 18F2420: Architecture – registers - program memory - stack-interrupts – ports – timers - oscillator-power supply

Introduction to programming PIC microcontrollers using MPLAB.

References

1. Lyla B. Das, The x86 Microprocessors: 8086 to Pentium, Multi cores, Atom and the 8051 Microcontroller, 2/e, Pearson Education. ISBN-13**:** 978-9332536821.
2. Tim Wilmshurst, Designing Embedded Systems with PIC Microcontrollers, Newnes Publisher, ISBN:9780080961842
3. Muhammad Ali Mazidi, Rolin D. McKinlay, Danny Causey, PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18, Pearson Prentice Hall, ISBN:9780131194045
4. Muhammad Ali Mazidi, The 8051 Microcontroller and Embedded Systems, Prentice Hall, ISBN:9780138610227

5 Barry B. Brey, The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit Extensions : Architecture, Programming, and Interfacing, Pearson Education India, ISBN:9788131726228

6 Intel x86 processors programmer's reference manuals.

Type of Questions for End Semester Exam

PART A

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

CS15-1506 COMPUTER GRAPHICS

Course Objectives

To introduce the concepts of computer assisted picture generation and manipulation
To understand an overview of interactive computer graphics, two dimensional system and mapping
To understand the most important algorithms for graphical primitives, transformation, clipping and filing for 2D objects
To study curve generation, 3-D picture generation, transformations and animation techniques

Course Outcomes

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

1. Gain knowledge in the structure of an interactive computer graphics system
2. Gain knowledge in generation and transformations for 2D geometrical objects, filling and clipping operations
3. Gain knowledge in curve generation
4. Gain knowledge of techniques for generation of 3D geometrical objects, 3D transformations, projections and rendering and animation
5. Gain knowledge in designing interactive graphics systems

Module-I

Graphic hardware: Raster scan and random scan displays, color CRTs, Hard copy output devices, interactive input devices, Output primitives –points and lines. Line drawing algorithms – dda-Bresenham, parametric and nonparametric forms of circle and ellipse, midpoint algorithms for circle and ellipse, polygon filling algorithms – boundary fill, flood fill and scan line fill, Filling arcs – pattern filling - Attributes of output primitives - Antialiasing. Graphical user interface - Logical classification of input devices

Module-II

Two dimensional transformations: Representation of points - Transformations and matrices - transformation of points- Transformations of lines – Rotation - Reflection- Scaling - Combined transformations - Homogeneous coordinates. Viewing transformations: Viewing pipeline, window to viewport transformation. Clipping: Interior and exterior clipping-Point clipping- Line clipping - Cohen

Sutherland - Liang Barsky- Sutherland Hodgeman Polygon clipping- Curve clipping - Text clipping. Curves: Curve representation- Geometric and Parametric Continuity – Natural Cubic Splines - Hermite spline - Bezier curves - B-spline curves.

Module-III

Three dimensional object representations: polygon surfaces, polygon tables, plane equations, polygon meshes, Quadric surfaces, sweep representations, Bezier surfaces, B-spline surfaces. Three Dimensional Transformations: Three dimensional scaling, shearing, rotation, reflection, translations - Rotation about arbitrary axis Parallel to coordinate axis- Rotation about arbitrary axis in space. Projections: Orthographic projections – Oblique projections-perspective projections and Vanishing points. Visible surfaces: classification of visible surface detection algorithms, Back Face detection method - Depth buffer method(z-Buffer algorithm)- A-Buffer method-Screen subdivision method-Painter's algorithm - Scan line algorithms- octree hidden surface elimination.

Module-IV

Rendering: Illumination models-diffuse reflection – specular reflection-Determining surface normal and reflection vector- Polygon rendering – Gouraud shading- Phong Shading -Ray tracing- Texture mapping . Color models: Color- Chromacity - Tristimulus theory of color – RGB color system -CMY color system - HSV color system. Modeling techniques and fractals: Surfaces and hierarchical modeling- Hierarchical modeling with structures – Fractals. Animation: Computer assisted animation – Real-Time animation techniques.

References

1. Donald Hearn, Pauline Baker, M., Computer Graphics with OpenGL, 3rd Edition, Pearson Education, 2004, ISBN:978-0-13-015390-6
2. David F. Rogers, Procedural Elements for Computer Graphics, 2nd Edition, Tata McGraw Hill, 2001, ISBN-13:978-0-07-047371-3, ISBN-10:0-07-047371-4
3. David F. Rogers, Mathematical Elements for Computer Graphics, 2nd Edition, Tata McGraw-Hill,2001,ISBN-13:978-0-07-048677-5,ISBN-10:0-07-048677-8
4. James D. Foley et.al., Introduction to Computer Graphics, Addison Wesley Publishing Company, 1994, ISBN : 0-201-60921-5
5. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics Principles

Type of Questions for End Semester Exam

PART A

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

CS15-15L1 COMPUTER GRAPHICS LABORATORY

Course Objectives

To introduce the concepts of computer assisted picture generation and manipulation using open GL graphics library

Course Outcomes

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

1. Gain in-depth knowledge on the structure of an interactive computer graphics system.
2. Gain expertise in graphics programming with openGL.
3. Gain knowledge in generation and transformations for 2D geometrical objects, filling and clipping operations.
4. Gain knowledge in curve generation.
5. Gain knowledge of techniques for generation of 3D geometrical objects, 3D transformations, projections and rendering and animation.

1	Study of graphical input devices and display devices and different display standards
2	Study of OpenGL libraries and programming techniques
3	Programming using OpenGL libraries in C, C++ or Java to Implement Line, Circle and Ellipse drawing algorithms, Seed filling algorithms and scan line filling method
4	Implementing 2D and 3D transformations (Use Homogeneous coordinate system)
5	Implement line clipping algorithms, polygon clipping algorithms, text and curve clipping methods
6	Programs for generating Space curves
7	Programs for hidden surface elimination
8	Programs for rendering polygon surfaces
9	Simple animation techniques
10	Generating fractal images

References

1. Edward Angel, Interactive Computer Graphics A Top-Down approach Using OpenGL, 5th Edition,

Pearson, ISBN: 978-81-317-2530-6.

2. Donald Hearn, Pauline Baker, M., Computer Graphics with OpenGL, 3rd Edition, Pearson Education, 2004, ISBN:978-0-13-015390-6
3. David F. Rogers, Procedural Elements for Computer Graphics, 2nd Edition, Tata McGraw- Hill, 2001, ISBN- 13:978-0-07-047371-3, ISBN-10:0-07-047371-4
4. Mason Woo et.al, OpenGL Programming Guide – The official guide to learning OpenGL, 3rd Edition, OpenGL Architecture Review Board

5 Noman Lin, Linux 3D Graphics Programming, Wordware Game Developer's Library.

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.

CS15-15L2 MICROPROCESSORS LABORATORY

Course Objectives

To enable the students to implement assembly language programming and interfacing using 8085 and x86 microprocessors and microcontrollers

Course Outcomes

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

1. Perform the given set of operations like 8 bit addition, subtraction, multiplication and division
2. Perform code conversion, counters using 8085 microprocessor
3. Perform basic arithmetic, logical and system related operations using 8086 microprocessor
4. Perform peripherals and interfacing experiments using 8085 and 8086 Microprocessors

1 Assembly language programming to explore instruction set of 8085 using the microprocessor kit
- Basic Programming
- Sorting
- Code Conversion
-Counters

2 Design and implementation of basic interface circuits (Any two)
i) Interfacing 8085 with 8255
ii) Interfacing 8085 with 8279
iii) Stepper motor
iv) ADC/DAC
v) Hex keyboard
vi) LCD

3 x86 Assembly language programming using TASM/MASM/NASM
-Familiarise assembler directives, addressing modes and memory models
- Interrupts and functions.
- Arithmetic operation using keyboard inputs and display on the screen (Signed and Unsigned)
- Programs on array manipulation using Indirect, indexed and based indexed addressing modes.
- Programs using keyboard interrupts - manipulate key functions
- Programs using display interrupts - managing texts and drawings

- Programs using disk interrupts - formatting, partitioning, file management
- Programs using interrupts to read and set system parameters - date, time, resolution, BIOS parameters, etc.
- Programs to test Memory resident programs

4 Interfacing with 8051/PIC (Any two)
- DAC, ADC, steppermotor, hexkeyboard, LCDdisplays, LED

5 Familiarising computer hardware components, assembling and trouble shooting

References

1. 8080/8085 Assembly Language Programming Manual, Intel Corporation
2. Barry B. Brey, The 8085A Microprocessor: Software, Programming, and Architecture, Prentice Hall, ISBN:9780130908049.
3. Ytha Y. Yu, Charles Marut, Assembly Language Programming and Organization of the IBM PC, McGraw-Hill, ISBN:9780071128964
4 Sivarama P. Dandamudi, Guide to Assembly Language Programming in Linux, Springer, ISBN:10: 0-387-26171-0
5 Jeff Duntemann, Assembly Language Step-by-Step: Programming with DOS and Linux, 2nd Edition, John Wiley & Sons, ISBN:0471375233
6 Lyla B. Das, The x86 Microprocessors: 8086 to Pentium, Multi cores, Atom and the 8051 Microcontroller, 2nd Edition, Pearson Education, ISBN-13**:** 978-9332536821.
7 Mazidi, The 8051 Microcontroller And Embedded Systems Using Assembly And C, Pearson Education India, ISBN: 9788131710265
8 Mazidi, PIC Microcontroller And Embedded Systems: Using Assembly And C, 2nd Edition, Pearson Education India, ISBN: 9788131716755

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.

CS15-1601 COMPUTER NETWORKS

Course Objectives

To introduce computer networks and build a firm foundation for understanding Computer Networks
To understand the TCP / IP Reference Model and major issues in the different layers

Course Outcomes

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

1. Understand fundamental underlying principles of computer networking
2. Understand details and functionality of layered network architecture
3. Apply mathematical foundations to solve computational problems in computer networking
4. Understand ethical, legal, security, and social issues related to computer networking

Module-I

TCP/IP Protocol stack - Application Layer: Application layer protocols:- WWW and HTTP, FTP, DNS, SMTP, SNMP, RPC, P2P File sharing, Domain Name System (DNS)

Module-II

Transport layer: Transport Layer Services, Relationship with Network Layer, Relationship with Application Layer, Multiplexing and Demultiplexing, UDP, TCP: Header, Segment Structure, Services, Connection establishment and termination, Flow control and window size advertising, TCP timeout and retransmission, Congestion Control, TCP Fairness, Delay Modeling.

Module-III

Network Layer: Network layer Services, Datagram and Virtual circuit services, IP datagram format and Types of Services, Datagram encapsulation and Fragmentation, Reassembly and fragmentation
Routing : Queing Theory - max flow mincut theorem - Link state routing, distance vector routing, hierarchical routing, multicast routing

Module-IV

Data link layer services: Error detection and correction techniques, Elementary Data link layer protocols, sliding window protocols, HDLC, Multiple access protocols, TDM, FDM, CDMA Random access protocols: ALOHA, CSMA, CSMA/CD, CSMA/CA. Circuit and Packet Switching, Virtual Circuits,

Switching Technology for LAN, Ethernet switches, Virtual LAN
Physical Layer, High speed Networks and Network programming: Physical Layer services, ISDN, BISDN, Frame relay, Fast Ethernet and Gigabit Ethernet, FDDI, SONET .NETBIOS programming, TCP/IP and Socket programming.

References

1. James F. Kurose and Keith W. Ross, Computer Networking – A Top-Down Approach Featuring the Internet, 5th Edition, Pearson Education, 2010, ISBN: 978-0-13-607967-5.
2. Achyut S. Godbole, Atul Kahate, Data Communications and Networks, Tata McGraw Hill Publishing Company Ltd, 2nd Edition, 2004
3. Andrew S. Tanenbaum, Computer Networks, 4th Edition, Pearson education, 2003, ISBN: 978- 8-17-758165-2.
4. Keshav, S., An Engineering Approach to Computer Networking, Pearson Education, 2002
5. Douglas E. Comer, Computer Networks and Internet, 2nd Edition, Pearson Education, 2004
6. Behrouz A. Fourouzan, Firouz Mosharraf, Computer Networks - A Top Down Approach, Tata McGraw Hill, 2012, ISBN: 13978-1-25-900156-7

Type of Questions for End Semester Exam

PART A

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

CS15/IT15-1602 COMPILER CONSTRUCTION

Course Objectives

To introduce the concepts and principles of compiler design
To provide understanding of grammar for syntax and semantic verification of programming statements
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 the 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. Alfred V. Aho, Ravi Sethi & Jeffrey D. Ullman, Compilers Principles, Techniques & Tools, Pearson
2. Kenneth C. Louden, Compiler Construction: Principles And Practice, Thomson Learning, India
3. Keith D. Cooper & Linda Torczon, Engineering a Compiler, 2nd Edition, Elsevier, New Delhi.
4. Muchnick, S.S., Harcourt Asra, Advanced Compiler Design implementation, Morgan Kaufman
5. Alan Holub, Compiler Design in C, PHI

Type of Questions for End Semester Exam

PART A

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

CS15-1603 CRYPTOGRAPHY AND NETWORK SECURITY

Course Objectives

To understand security concepts and ethics in Network Security.
To understand security threats and the security services and mechanisms to counter them
To comprehend and apply relevant cryptographic techniques
To comprehend and apply authentication services and mechanisms
To comprehend relevant protocols like SSL, SSH etc.
To comprehend and apply email security services and mechanisms
To comprehend and apply web security services and mechanisms
To comprehend computer and network access control

Course Outcomes

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

1. Familiarise with information security awareness and a clear understanding of its importance
2. Familiarise with how threats to an organization are discovered, analyzed, and dealt with
3. Master fundamentals of secret and public cryptography
4. Master protocols for security services
5. Familiarise with network security threats and countermeasures
6. Familiarise with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)

Module-I

Module I Introduction- Security problem in computing, Security in Networks. Elementary Cryptography- Introduction- Substitution, Transposition, Hill Ciphers and Affine Ciphers . Review of Number Theory - Modular arithmetic.

Module-II

Encryption Algorithms-Symmetric Key encryption-DES- The Feistel cipher structure. The avalanche Effect. Modes of operations of DES algorithm .AES-S-boxes.

Module-III

Public Key encryption. RSA Cryptosystem. Primality testing- Miller-Rabin Algorithm. Diffie- Hellman Cryptosystem- ElGamal Scheme Elliptical Curve Cryptography and Elliptic curves over Finite Fields.

Hash Algorithms -SHA1 and MD-5.

Module-IV

Authentication protocols, Authentication Applications-Kerberos,X.509,Digital Signature, Secure e-mail, SSL, IP Security. System security –Intruders, Malicious Software, Firewalls.

References

1. Stallings W., Cryptography and Network Security Principles and Practice, 4th Edition, Pearson
2. Mao,W., Modern Cryptography : Theory and Practice, HP Professional Series, 2011
3. Behrouz A. Forouzan, Debdeep Mukhopadhyay, Cryptography and network security, 2nd Edition, McGraw Hill.

Type of Questions for End Semester Exam

PART A

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

CS15-1604 DATA MINING

Course Objectives

To understand important concepts in data sciences
To understand various types of data, its collection and cleaning
To understand various applications of data mining
To understand various classification models in data mining
To understand developments in big data technologies

Course Outcomes

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

1. Apply the various data preprocessing techniques to clean data
2. Apply various classifiers to model data
3. Analyse data using various data mining techniques
4. Get a basic understanding of data mining and big data applications in research and industry

Module-I

Data Mining-Purpose-Various phases of data mining - supervised vs. unsupervised –learning- Data Warehouses - OLAP-Multidimensional databases-Data Preprocessing-Case studies in data preprocessing-Different applications of data mining

Module-II

Association rules mining-Apriori algorithms- Examples -Possibilities for improvement-Classification concepts and case studies-Decision trees, Neural networks, Naïve Bayes classifier, Support vector machines

Module-III

Cluster Analysis-K-Means algorithm-Example and suggestions for improvements- A Categorization of Major Clustering Methods, Partitioning Methods,Hierarchical Methods, Density-Based Methods(DBSCAN), Time series mining, Graph Mining-Case studies

Module-IV

Introduction to cloud computing-Services from a cloud- Big Data-definition-data bases for the big data platform-Introduction to Hadoop its architecture and ecosystem. MapReduce-basic concepts-Introduction to Spark

References

1. Sudheep Elayidom, M., Data Mining and Warehousing, Cengage Learning.
2. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques – 3rd Edition , Morgan Kaufmann Publishers.
3. Gupta, G.K., Data mining, 3rd Edition, PHI publications
4. Soman, K.P., Shyam Divakar, Ajay, V., Insight into data mining-theory and practice 1st Edition, PHI publications.
5. Richard Royger, Data mining – 1st Edition, Pearson Education
6. Tom White, Hadoop: The definitive guide, 4th edition, OReilly Publishers.
7. Karau, H. et.al, Learning Spark: lightning-fast big data analysis, OReilly Publishers

Type of Questions for End Semester Exam

PART A

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

\

CS15-1605 EMBEDDED SYSTEM DESIGN

Course Objectives

To understand the characteristics of embedded systems
To learn the mechanisms behind the state-of-the-art architectures for embedded systems
To evaluate the features of the various architectures
To select the embedded architecture which is most suitable for different applications
To study performance evaluation and optimization methods

Course Outcomes

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

1. Understand the architecture of embedded systems and SoC.
2. Understand the characteristics of embedded systems.
3. Learn about the features of embedded operating systems.
4. Understand the design procedure and analysis of embedded systems.

Module-I

Concepts of control system: Definitions-open loop system-closed loop system, Embedded computing-introduction-complex systems and microprocessors-embedded system design process.
Instruction set- preliminaries-ARM processor.

Module-II

CPU- Programming input and output-supervisor mode-exceptions and trap-co-processors-memory system mechanisms-CPU performance-CPU power consumption.
Computing platforms- basic computing platforms-The CPU bus-memory devices and systems-designing with computing platforms-consumer electronics architecture-platform level performance analysis.

Module-III

Program Design and analysis-components for embedded programs-models of program-Assembly, linking and loading-Compilation techniques-program level performance analysis. Software performance optimization -program level energy and power analysis and optimization-Analysis and optimization of program size-program validation and testing.
Processes and OS-multiple tasks and multiple processes-Multirate systems-Preemption real-time OS-priority based scheduling-Interprocess communication mechanism.

Module-IV

System design techniques-design methodologies-requirement analysis-specifications-system analysis and architecture design- quality assurance.

Network and multiprocessors-categories of multiprocessors-distributed embedded systems-MPSoCs and shared memory multiprocessors.

References

1. Marilyn Wolf, Computers as Components , 3rd Edition, Morgan Kaufmann, ISBN -13-978-0123884367
2. Raj Kamal, Embedded System, Architecture programming and Design, 2nd Edition,Tata McGraw-Hill Education, ISBN-13:978-0-07-066764-8
3. Vahid, Embedded System Design: A Unified Hardware/Software Introduction, John Wiley & Sons. ISBN:9788126508372
4. Jack Ganssle, The Art of Designing Embedded Systems, 2nd Edition, Newnes, ISBN:9780080568799
5. Tammy Noergaard, Embedded Systems Architecture, Newnes, ISBN:978-81-8147-997-6
6. Arun K. Ghosh, Introduction To Control Systems, PHI Learning Pvt. Ltd., ISBN-13:9788120348202

Type of Questions for End Semester Exam

PART A

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

CS15-1606E1 ETHICAL HACKING AND COMPUTER FORENSICS

Course Objectives

To familiarise students with hacking techniques, methodologies, tools, tricks and security measures to secure an organization's IT systems

To make them aware of measures that should be taken if any untoward incidents happen

Course Outcomes

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

1. Familiarise with hacking techniques and equipped with countermeasures
2. Gain basic ideas of forensic steps to recover lost data

Module-I

Introduction, Networking & Basics, Footprinting, Google Hacking, Scanning, Linux Hacking, Trojans and Backdoors, Virus & Worms, Proxy & Packet Filtering, Social Engineering. Hacking windows – Network hacking – Web hacking – Password hacking. A study on various attacks– Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks.

Module-II

TCP / IP – IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Batch File Programming.

Module-III

Overview of computer forensics technology: computer forensics fundamentals, Types of computer forensics technology, Types of computer system.

Module-IV

Computer forensics Evidence and Capture: Evidence collection and data seizure, Duplication and preservation of digital evidence, Computer forensics analysis

References

1. Ankit Fadia, Ethical Hacking, 2nd Edition, Macmillan India Ltd, 2006
2. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition
3. Michael T. Simpson, Kent Backman, James Corley, Hands On Ethical Hacking and Network

Defense

PART A

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 , Vwith 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

CS15-1606E2 SYSTEM MODELING AND SIMULATIONS

Course Objectives

To learn various simulation and modeling techniques

To provide fundamental knowledge of various mathematical models used for the purpose of simulation and modeling, along with analysis of simulation data and related case studies

Course Outcomes

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

1. Understand the various simulation and modeling tools used
2. Understand how different modeling is done mathematically
3. How and when to collect simulation data for modeling
4. Understand Advancements in computer based simulation scenarios

Module-I

Introduction to simulation: Introduction – Simulation Terminologies – Application areas – Model Classification – Types of Simulation – Steps in a Simulation study – Concepts in Discrete Event Simulation – Simulation Examples

Module-II

Mathematical Models: Statistical Models – Concepts – Discrete Distribution – continuous Distribution – Poisson Process – Empirical Distributions – Queueing Models – Characteristics – Notation – Queueing Systems – Markovian Models – Properties of random numbers – Generation of Pseudo Random numbers – Techniques of generating random numbers – Testing random number generators - Generating Random – Variates – Inverse Transform technique – Acceptance – Rejection technique – Composition & Convolution Method.

Module-III

Analysis Of Simulation Data: Input Modeling – Data collection – Assessing sample independence – Hypothesizing distribution family with data – Parameter Estimation – Goodness-of-fit tests – Selecting input models in absence of data – Output analysis for a Single system – Terminating Simulations – Steady state simulations.

Verification and validation: Model Building – Verification of Simulation Models – Calibration and Validation of Models – Validation of Model Assumptions – Validating Input – Output Transformations.

Module-IV

Simulation of Computer Systems and Case Studies:Simulation Tools – Model Input – High level computer system simulation – CPU – Memory Simulation – Comparison of systems via simulation –

simulation Programming techniques – Development of Simulation models.

References

1. Jerry Banks and John Carson, Discrete Event System Simulation, 4th Edition, PHI, 2005
2. Geoffrey Gordon, System Simulation, 2nd Edition, PHI, 2006, ISBN 978-81-203-01405
3. Frank L. Severance, System Modeling and Simulation, Wiley, 2001.
4 Averill M. Law and David Kelton, W., Simulation Modeling and Analysis, 3rd Edition, McGraw Hill, 2006.
5 Jerry Banks, Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice Wiley, 1998.
6 Jerry Banks, Carson, J.S., Barry L. Nelson, David, M. N., Shahabudeen, P., Discrete - Event System Simulation, Pearson 4th Edition.

Type of Questions for End Semester Exam

PART A

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

CS15-1606E3 COMPUTATIONAL LINGUISTICS

Course Objectives

To introduce the core algorithms, data structures, and applications of computational linguistics
To learn about the difficulties inherent in natural language processing tasks and to get an understanding of the various strategies for tackling them

Course Outcomes

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

1. Understand core algorithms (rule based and statistical)and data structures used in NLP
2. Gain knowledge in development of tools for NLP
3. Write computational grammar and analyze their adequacy
4. Gain insight into the possibilities and difficulties of automatic semantic analysis of text
5. Apply NLP techniques to problems like information retrieval, machine translation and text categorization

Module-I

Words- Regular Expressions and Finite Automata-Morphology and Finite State Transducers-Probabilistic Models of Pronunciation and Spelling -N grams, HMMs and speech recognition, computational phonology and Text to speech

Module-II

Syntax- Word Classes and Part-of-Speech Tagging and chunking-HMM Taggers- probabilistic Context Free Grammars for English Syntax-Parsing with Context Free Grammars- lexicalized and probabilistic parsing- Features and Unification-Language and Complexity

Module-III

Semantics-Representing Meaning-canonical forms- FOPC-ambiguity resolution-scoping phenomena - Semantic Analysis-syntax driven semantic analysis-Lexical Semantics-Word Sense Disambiguation and Information Retrieval

Module-IV

Pragmatics- Discourse-Reference Resolution -Text Coherence -Dialog and Conversational Agents-Dialogue acts-dialogue structure, natural language generation, Statistical alignment and machine translation-clustering- text categorization

References

1. Daniel Jurafsky and James Martin, Speech and Language Processing, 2nd Edition, PH, 2008
2. James Pustejovsky, Amber Stubbs, Natural language annotation for machine learning, O'Reilly, 2012
3. Alexander Clark and Chris Fox, The Handbook of Computational linguistics and natural language processing, Wiley-Blackwell, 2012
4. Grant S Ingersoll, Thomas Morton, Andrew L Farris, Taming Text, Manning Publications, 2013
5. Christopher D. Manning and Hin Rich Schutze, Foundations of statistical natural language processing, 1st Edition, MIT press, 1999

Type of Questions for End Semester Exam

PART A

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

CS15-1606E4 BIOINFORMATICS

Course Objectives

To equip the students with the requisite background in areas of modern biology and computer science

Course Outcomes

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

1. Launch into core areas of Bioinformatics like sequence alignment, phylogenetic trees, genomics, proteomics, etc.
2. Explore the applied areas of Bioinformatics like drug design, metabolic pathway engineering

Module-I

Biological Databases -Biological data types, Major biological databases and its classification, sequence and structure file formats, data mining.

Module-II

Sequence Analysis Methods of sequence alignment. Pair wise alignment-Global, local, dot plot and its applications. Words method of alignment- FA and its variations, Filtered and gapped BLAST, PSI BLAST, Multiple sequence methods and Tools for MSA, Application of multiple alignments, Viewing and editing of MSA

Module-III

Phylogeny -Concepts of trees- Distance matrix methods, Character based methods. Solving UPGMA, NJ and small parsimony problems. Methods of evaluating phylogenetic methods- bootstrapping, jackknifing

Module-IV

Macromolecular Structure Analysis -Gene prediction, Conserved domain analysis, Protein visualization, Prediction of protein secondary structure, Tertiary structure prediction- Validation of the predicted structure using Ramachandran plot, stereo chemical properties.

References

1. Cynthia Gibas, Per Jambeck, Developing Bioinformatics Computer Skills, O'Reilly Media Inc., 2001
2. David Edwards, Jason Eric Stajich, David Hansen, Bioinformatics Tools and Applications, Springer, 2009
3. David W Mount, Bioinformatics: Sequence and genome analysis, Cold spring harbor laboratory press, 2nd Edition, 2004
4. Attwood, T. K., Parry, D.J., Smith, Introduction to Bio informatics, Pearson Education, 2005
5. Stan Tsai C., Bio macro molecules: Introduction to Structure, Function and Informatics, John Wiley

& Sons, 2007

Type of Questions for End Semester Exam

PART A

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

CS15-1606E5 DIGITAL IMAGE PROCESSING

Course Objectives

To provide a fundamental understanding of various image processing concepts such as image representations, transformations, etc.

To learn advanced concepts like image enhancements, segmentation and restoration

Course Outcomes

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

1. Understand the basics of image processing
2. Image mapping, matrices and basic transformations
3. Understand advanced concepts of image enhancements
4. Understand advancements in image segmentation and restorations

Module-I

Digital Image Fundamentals: Representation of digital image -Elements of visual perception – Image sampling and quantization- Basic relationship between pixels. Review of Matrix Theory: Row and column ordering-Toeplitz, Circulant and Block Matrices Image Transforms: 2D DFT, Hadamard, Haar, DCT, Wavelet Transforms.

Module-II

Image Enhancement: Spatial domain methods: Basic Gray Level Transformations-Histogram Processing: Equalization and specification- Fundamentals of Spatial Filtering: Smoothing, Sharpening spatial filters. Frequency domain methods: low pass filtering, high pass filtering, homomorphic filtering.

Module-III

Image segmentation: Detection of discontinuities: Point Line and Edge Detection - Edge linking and boundary detection - Hough transform – Thresholding - Region based segmentation: Region growing- Region splitting and merging - Use of motion in segmentation. Representation and Description: Representation, Boundary Descriptors: Shape numbers, Fourier descriptors, statistical moments - Regional Descriptors: Topological descriptors, texture.

Module-IV

Image Restoration: Degradation Model- Restoration in the presence of Noise only-Spatial Filtering - Periodic Noise reduction by frequency domain filtering- Linear position Invariant degradations- Estimating the degradation function- Inverse filtering - Wiener filter - Constrained Least squares filtering. Fundamentals of Colour image processing: Colour models - RGB, CMY, YIQ, HIS - Pseudo colour image processing - intensity slicing, gray level to color transformation.

References

1. Gonzalez and Woods, Digital Image Processing, Pearson Education, 3rd Edition, 2008
2. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall India, 2010
3. William K. Pratt, Digital Image Processing, John Wiley and Sons, 4th Edition, 2007

Type of Questions for End Semester Exam

PART A

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

CS15-16L1 OPERATING SYSTEM LABORATORY

Course Objectives

To understand and write program in linux environment in python language
To design and implement the scheduling algorithms
To design and implement system operations
To design and implement IPC
To design and implement kernel programming and shell scripts
To know how to build linux kernel to add modules and drivers.

Course Outcomes

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

1. Write system level programs
2. Develop shell scripts and kernel programming
3. Implement scheduling algorithms
4. Build Linux kernel

1	Study of different system calls
2	Programs using the system calls of linux operating system.- fork,exec,getpid,exit,wait,close,stat,opendir,readdir
3	Programs using the I/O system calls of linux operating system
4	Programs to simulate linux commands like ls,grep etc.
5	Programs to study and analyse various scheduling policies
6	Programs to implement IPC using shared memory,pipes,and message queue
7	Programs to study uses of semaphore
8	Linux shell programming
9	Kernel programming--Linux Kernel configuration, compilation and rebooting from the newly compiled kernel
10	Kernel space programming: Implement and add a loadable kernel module to Linux kernel, demonstrate using insmod, lsmod and rmmod commands
11	Developing device drivers
12	Creating Linux distributions from debian source

References

1. Richard Stevens, W., UNIX Network Programming: Interprocess communications, Volume 2, 2nd Edition, Prentice Hall, ISBN:9780130810816
2. Peter Jay Salzman, Michael Burian, Ori Pomerantz, The Linux Kernel Module Programming Guide.

Free book downlable from http://www.tldp.org/LDP/lkmpg/2.6/lkmpg.pdf

3. Robert Love, Linux Kernel Development, 3rd Edition, Addison-Wesley Professional, ISBN:978-0672329463
4. Mark G. Sobell, Practical Guide to Linux Commands, Editors, and Shell Programming, 3rd Edition , Prentice Hall, ISBN-13: 978-0133085044

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.

CS15-16L2 MINI PROJECT

Course Objectives

To understand programming language concepts
To plan, analyze, design and implement a software project
To demonstrate independent learning
To demonstrate the ability to locate and use technical information from multiple sources
To demonstrate an understanding of professional ethics
To participate in a project team
To demonstrate the ability to communicate effectively in speech and in writing

Course Outcomes

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

1. learn to work as a team and to do a working project on time with each student taking responsibility for their part of the project
2. learn about software development cycle with emphasis on different processes - requirements, design, and implementation phases
3. gain confidence at having conceptualized, designed, and implemented a working, medium sized project with their team

The students are expected to develop an application in the field of embedded system / mobile application / any other current relevant topic. They have to do a proper system study and prepare SRS and design documents.

Each batch comprising of 3 to 5 students shall design. Each student shall submit a project report at the end of the semester. The project report should contain the design and engineering documentation and test results. Product has to be demonstrated for its full design specifications. Innovative design concepts, reliability considerations and aesthetics / ergonomic aspects taken care of in the project shall be given due weight.

Guidelines for evaluation:

i) Attendance and Regularity	5
ii) Work knowledge and Involvement	15
iii) End-Semester presentation & Oral examination	10
iv) Level of completion and demonstration of functionality/specifications	13
v) Project Report	7
Total	50 marks

Note: External projects and R&D projects need not be encouraged at this level. Points (i) & (ii) to be evaluated by the project guide & coordinator and the rest by the final evaluation team comprising of 3

Teachers including the project guide.

GE15-1701: 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 to:

1. Inculcate the ability of formulating, analysing, and solving management problems through the application of scientific management.
2. Introduce the importance of Productivity and Project Management.
3. Get exposed to personnel, marketing and financial management.
4. 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-coordinating, 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. Fraidoon Mazda, Engineering Management, Addison-Wesley, (1997).
2. Koontz and O'Donnell, Essentials of Management, Mc Graw Hill, (1978).
3. Kotler P., Marketing Management, Prentice Hall, (2011).
4. Prasanna Chandra, Finance Management, Tata Mc Graw Hill, (2008).
5. Monks, J. G., Operations Management, Mc Graw Hill, (1982).
6. Cornish, W. R., & Llewellyn, Intellectual Property, Sweet & Maxwell, 6th Ed., (2007).
7. WIPO, Intellectual Property Hand book, WIPO Publication, (2004).
8. David Hunt, Long Nguyen and Matthew Rodgers, Patent Searching: Tool and Techniques, John Wiley and Sons, (2007).
9. Neil F. Sullivan, Transfer of Technology, Cambridge University Press, (1995).
10. Lipsey, R., & Chrystal, K. A., Economics, Oxford University Press, 13 Ed. (2013).
11. Case E. Karl & Ray C. Fair, Principles of Economics, Pearson Education, 8th Ed. (2009).
12. Mankiw, N. G., Principles of Economics, Thomson South-Western, 3rd Ed. (2005).

Type of Questions for End Semester Exam

PART A

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 I

CS15-1702 ADVANCED COMPUTER NETWORKS

Course Objectives

To acquire foundational understanding on the concept of Internetworking in terms of the technologies and techniques that drive Internet

To get in-depth understanding of advanced concepts of TCP/IP protocol suite and its architecture

To demonstrate the understanding of internet model, and the TCP/IP protocol suite

To build an understanding of the core issues encountered in the design of wireless (vs wired) networks

To fairly recent paradigms in wireless communication

Course Outcomes

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

1. Identify and explain the essential components that drive internetworking (students would be equipped with the knowledge to explain the relationships between the components and how they affect one another)
2. Understand the complete architecture of internetworking and the operations of underlying protocols and software
3. Study the specifications and functionalities of various protocols/standards of mobile networks
4. Understand the information theoretical aspects (such as the capacity) of wireless channels and basic spread spectrum techniques in mobile wireless systems
5. Describe current and future cellular mobile communication systems (GSM, mobile IP, Bluetooth)

Module-I

Multimedia Networking- Multimedia Applications, Streaming stored audio and video, Protocols for real time Interactive applications, Scheduling Policies, RSVP,Differentiated services Security in Computer Network -Access control Firewalls

Module-II

Introduction to ICMP,DHCP and NAT. Network Management: SNMP and RMON models

Module-III

Wireless transmission: Frequencies for radio transmission-Signals-Antennas-Signal propagation-Multiplexing-Modulation-Spread spectrum-Cellular systems. Medium access control: SDMA-FDMA-TDMA-CDMA-Comparison of S/T/F/CDMA.

Module-IV

Telecommunications systems. GSM,:-System Architecture, Radio Interface, Protocols, Addressing-Call management and Handover. GPRS and UMTS networks. Wireless LAN(WiFi): Infrared vs radio transmission-Infrastructure and ad-hoc network-IEEE 802.11a,b,g, 802.15 and 802.16 protocol standards – Bluetooth - Principle of WiMax . Mobile IP

References

1. James F. Kurose and Keith W. Ross, Computer Networking – A Top-Down Approach Featuring the Internet,6th Edition Pearson Education ,2010, ISBN:978-0-13-607967-5.
2. Douglas E. Comer, Internetworking With TCP/IP Volume 1: Principles Protocols, and Architecture, 5th Edition, Prentice Hall,2006. (Module I and II), ISBN:978-8-12-031053-7
3. Schiller, Mobile Communication, 2nd Edition , Addison Wesley, 2005 (Module III and IV) ISBN:978-0321123817
4. Youlu Zheng and Shakil Akhtar, Networks for Computer Scientist and Engineers, Oxford University Press,2006

Type of Questions for End Semester Exam

PART A

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

CS15-1703 ANALYSIS AND DESIGN OF ALGORITHMS

Course Objectives

To provide a solid foundation in algorithm design and analysis
To have basic knowledge of graph and matching algorithms
To understand and design algorithms using greedy strategy, divide and conquer approach and dynamic programming
To analyze asymptotic runtime complexity of algorithms including formulating recurrence relations
To have basic knowledge of computational complexity, approximation and randomized algorithms

Course Outcomes

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

1. Analyze the worst-case and average case running times of algorithms using asymptotic analysis.
2. Understand the concept of divide and conquer technique and how to apply the algorithm in various situations.
3. Understand the dynamic-programming paradigm and its algorithmic design situations.
4. Familiarise the greedy design technique.
5. Familiarise with some approximation algorithms and the benefit of using them.

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 Heapsort. Linear search and Binary search. 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, Matrix chain Multiplication

Module-IV

Complexity Theory - Introduction. P and NP. NP-Complete problems. Approximation algorithms. Bin

packing, Graph coloring. Traveling salesperson Problem. String matching: Robin – Karp algorithm, Knuth – Morris Pratt algorithm, Algorithm for parallel computers, parallelism, the PRAM models, simple PRAM algorithms.

References

1. Thomas H. Cormen, Charles E. Leiserson, Rivest, R. L., Algorithms, Prentice Hall of India Publications, New-Delhi.
2. Sara Baase and Allen Van Gelder, Computer Algorithms: Introduction to Design and Analysis ,Pearson education (Singapore) Pte. Ltd, New Delhi.
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman.. The Design and Analysis of Computer Algorithms, Pearson Education (Singapore) Pte. Ltd New Delhi.

Type of Questions for End Semester Exam

PART A

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

CS15-1704 WEB TECHNOLOGIES

Course Objectives

To understand the state of the art technologies for web development
To understand in detail the various programming frameworks in J2EEE technologies
To gain a basic understanding of other web technologies such as .NET and open source technologies

Course Outcomes

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

1. Understand the architecture of J2EE, .NET and open source web technologies
2. Design and develop framework based web applications in J2EE
3. Design and develop basic applications in .NET and other open source based web technologies

Module-I

Introduction to web technologies: Structure of a typical Web application, web services and its applications, Types of web applications-J2EE, .NET and Open Source based. Java Server Technologies Servlet Web Application Basics, Architecture and challenges of Web Application, JDBC, Introduction to servlet, Servlet life cycle, Developing and Deploying Servlets, Exploring Deployment , Descriptor (web.xml), Handling Request and Response.

Module-II

JavaServer Pages (JSP): Introduction, JavaServer Pages:Overview, First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries

Module-III

Java frameworks: JQuery, Spring framework - steps to use spring framework - Dependency Injection - Annotation based dependency injection - Data Accessing with spring - Hibernate - Components of Hibernate - Inheritance and relationships in hibernate - Hibernate query language-introduction to Struts, JSF, EJB.

Module-IV

Other web technologies: Open Source technologies: Frameworks: Ruby on rails, Zend, Restful PHP web services, Net framework for web application development, Using web services in .NET, ASP.NET web forms, Ext.net,Introduction to Node.

References

1. Deitel,H.M., Deitel, P.J., Santry, S.E., Advanced Java 2 Platform HOW TO PROGRAM – Prentice Hall

2. Antonio Goncalves, Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional Apress publication
3. Thai & Lam, NET Framework essentials, , OReilly publishers 3rd edition
4. BartoszPorebski, Karol Przystalski, Leszek, John Wiley and Sons, Building PHP Applications with Symfony, CakePHP, and Zend Framework,
5. Abeysinghe, RESTful PHP Web Services, Packt Publishing Ltd.
6. Guillermo Rauch, Smashing node.js:Javascript everywhere , John Wiley & Sons, 2012

Type of Questions for End Semester Exam

PART A

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 , Vwith 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

CS15-1705 E1 SOFTWARE PROJECT MANAGEMENT

Course Objectives

To understand the fundamental principles of software project management
To gain a good knowledge on the responsibilities of a project manager
To familiarise with the different methods and techniques used in project management

Course Outcomes

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

1. Gain knowledge on the issues and challenges to be faced while managing a software project
2. Familiarise with various project scheduling techniques, project control and monitoring
3. Identify factors that influence the performance of team members in a project environment
4. Understand the role of continuous training, improve team working and select appropriate leadership styles

Module-I

Introduction And Software Project Planning: Fundamentals of software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of Project plan, Structure of a Software Project Management Plan, software project estimation, Estimation methods, Estimation models, Decision process.

Module-II

Project Organization And Scheduling: Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts, Milestone charts, Gantt Charts.

Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

Module-III

Monitoring And Control: Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change control –Managing contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance.

Module-IV

Managing People and Organizing Teams: Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting the Right Person For The Job – Instruction in the Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working in Groups – Becoming a Team –Decision Making – Leadership – Organizational Structures – Stress – Health and Safety – Case Studies

References

1. Jalote, software Project Management in Practice, First edition, Pearson Education, ISBN: 978-7-30-210682-1.
2. Bob Hughes, Mike cotterell, Software Project Management, Third Edition, Tata McGrawHill, ISBN: 978-0-07-070653-8.
3. Ramesh, Gopalaswamy, Managing Global Projects, First edition, Tata McGraw Hill, ISBN: 978-0-07-059897-3.
4. Royce, Software Project Management, 1st Edition, Pearson Education, ISBN: 978-0-2-0130958-4.

Type of Questions for End Semester Exam

PART A

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

CS15-1705E2 ARTIFICIAL NEURAL NETWORKS

Course Objectives

To design basic neuron models: McCulloch-Pitts model to solve various logical functions
To design neural network models: multilayer perceptron, distance or similarity based neural networks, associative memory and self-organizing feature map
To implement various learning algorithms: the delta learning rule, the backpropagation algorithm and the counter propagation network algorithms
To develop applications: pattern recognition, function approximation, information visualization, etc.
To understand concept of fuzzy logic and how it works along with neural networks

Course Outcomes

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

1. Make an attempt to understand how the human brain works
2. Understand the structure of the brain and how some of the functions of the brain can be implemented by an artificial system i.e. the Artificial Neural Network
3. Get a basic knowledge to implement systems to recognize various patterns, images, sound, characters etc.

Module-I

Introduction to neural networks. Artificial neural networks. Biological neural networks- Comparison, Basic building blocks of ANN. Activation functions. McCulloch-Pitts Neuron Model, Hebb net. Learning Rules- Hebbian Learning Rules, Perceptron, Delta, Competitive,. Perceptron networks- single layer, multilayer –algorithm.

Module-II

Feedback Networks, Discrete Hopfield nets,. Feed Forward Networks: Back Propagation Networks, Learning Rule, Architecture, training algorithm. Counter Propagation Network: Full CPN, Forward only CPN, architecture, training phases.

Module-III

Adaptive Resonance Theory, architecture, learning in ART, Self Organizing feature maps: Kohonen SOM, Learning Vector Quantization, Max net, Mexican Hat, Hamming net. Associative memory networks, Algorithms for pattern association Hetero associative networks, Auto associative memory networks Bidirectional associative memory networks.

Module-IV

Special networks: Probabilistic neural networks, Cognitron, Simulated Annealing, Boltzmann machine, Cauchy machine, Support Vector Machine Classifiers. Application of Neural networks In Image

Processing and classification. Introduction to Fuzzy systems, Neuro fuzzy systems.

References

1. Dr. Sivanandam, S.N., Introduction to neural networks using MATLAB 6.0, Tata McGrawHill New Delhi.,2012 , ISBN 978-0-07-059112-7
2. Laurene Fausett, Fundamentals of neural networks, Prentice Hall, New Jersey, 2007. ISBN 81- 317-0053-4
3. James A. Freeman, David M. Skapura, Neural Networks Algorithms, Applications and Programming Techniques, Addison-Wesley, 2003 ISBN 81-7808-108-3.

Type of Questions for End Semester Exam

PART A

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

CS15-1705E3 HIGH PERFORMANCE EMBEDDED COMPUTING

Course Objectives

To learn the principles, concepts and practices of high performance embedded systems
To study processor evaluation techniques
To understand multiprocessor architecture
To learn hardware / software co-design

Course Outcomes

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

1. Understand the characteristics of HPEC
2. Understand parallel processing methods in embedded systems
3. Understand program optimization and performance analysis
4. Understand the details of Real-time OS and hardware /software co-design

Module-I

The landscape of HPEC - Example applications - Design methodologies - Embedded Systems Design flows - Models of computation - Parallelism and computation - Reliable system design - CE architectures

Module-II

Evaluating processors - RISC and DSP processors - Parallel execution mechanisms - Superscalar, SIMD and Vector processors- Variable performance CPU architectures - CPU Simulation - Automated CPU Design Code generation and back-end compilation - Memory oriented optimizations - Program performance analysis - Models of computation and languages

Module-III

Multiprocessor Architectures - Multiprocessor design techniques - Processing elements - Interconnection networks - Memory systems - Physically distributed systems and networks - multiprocessor design methodologies and algorithms

Module-IV

Multiprocessor software - RT multiprocessor operating systems - services and middleware for embedded multiprocessors - Hardware/Software co-design - performance analysis - Hardware/Software Co-Synthesis algorithms - Hardware/Software Co-Simulation

References

1. Marilyn Wolf , High-Performance Embedded Computing: Architectures, Applications, and Methodologies, Second Edition, Morgan Kaufmann, (2014) ISBN-13: 978-0123694850

2. Larry L. Peterson, Computer Networks: A Systems Approach, Morgan Kaufmann (2007) ISBN-13: 978-012370548
3. Joseph A. Fisher, Paolo Faraboschi, Cliff Young, Embedded Computing: A VLIW Approach to Architecture, Compilers and Tools, Elsevier. ISBN:9780080477541

Type of Questions for End Semester Exam

PART A

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

CS15-1705E4 ADVANCED MOBILE COMMUNICATIONS

Course Objectives

To understand various aspects of mobile communication over the ages

To learn about core technologies over different generations of mobile communication

Course Outcomes

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

1. Understand various generation of mobile technologies
2. Analyze the latest trends in mobile communication
3. Identify the research areas in 4G and 5G
4. Understand core concepts used in various generations of mobile communications

Module-I

Overview & Classification of Mobile Communication Systems. Mobile Communication Channel. Modeling of Propagation Loss. Diversity reception. Cellular System Concepts. Ways of increasing system capacity. First Generation Cellular Telephony.

Module-II

GSM Cellular Telephony. GSM Architecture. Radio Transmission Parameters of GSM. GSM Logical Channels. GSM Burst Structures. Call setup Procedures & Handover in GSM System. Data Transmission in GSM. HSCSD, GPRS, EDGE. CDMA in Mobile Communication Systems. Spreading Sequences. Basic Transmitter & Receiver Schemes in CDMA Systems. RAKE Receiver. Multi Carrier CDMA. IS- 95 System. Digital Cordless Telephony .Wireless Local Loops.

Module-III

Third Generation Mobile Communication Systems. IMT 2000. Concepts of UMTS. UTRA FDD Mode, UTRA TDD Mode.WCDMA. CDMA 2000. Application of Smart Antennas in Cellular Applicable to batch upto admitted in Aug 2011 Telephony. Satellite Mobile Communication Systems. Iridium, GlobalStar, ICO Systems.

Module-IV

Fourth Generation Mobile Communication Systems. Forerunner versions : 3GPP Long Term Evolution (LTE) , Mobile WiMAX (IEEE 802.16e) , TD-LTE for China market. IMT-2000 compliant 4G standards : LTE Advanced, IEEE 802.16m or Wireless MAN-Advanced . 5G : Research Constraints, Small cells, SON (self–organizing networks), future of 5G, internet and other related technologies.

References

1. Hazyszt of Wesolowski, Mobile Communication Systems, Wiley.
2. Theodore S. Rappaport, Wireless Communications Principles & Practice, Pearson Education, Jochen Schiller, Mobile Communications, Pearson Education.
3. Raj Pandya, Mobile & Personal Communication Systems And Service, PHI
4 Martin Sauter, 3G, 4G and Beyond: Bringing Networks, Devices and the Web Together
5 Jonathan Rodriguez, Fundamentals of 5G Mobile Networks
6 Dr. AnwarM.Mousa, Perspective of Fifth Generation Mobile Communications University of Palestine, Gaza- Palestine

Type of Questions for End Semester Exam

PART A

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

CS15-1705E5 NETWORK PROGRAMMING

Course Objectives

To provide hands on experience on network programming preliminaries
To provide in-depth understanding on network communication
To learn various network protocol implementation – TCP / UDP

Course Outcomes

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

1. In depth knowledge in network programming
2. Understand and implement Socket programming
3. Analysis of threading models in network programming
4. Programming TCP/UDP and Raw data communication
5. Understand inter process communication

Module-I

Introduction to Socket Programming – Overview of Protocols : TCP / UDP – Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write, close functions – Iterative Server – Concurrent Server.

Module-II

TCP Echo Server – TCP Echo Client – Posix Signal handling – Server with multiple clients – boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown – I/O multiplexing – I/O Models – select function – shutdown function – TCP echo Server (with multiplexing) – poll function – TCP echo

Module-III

Socket options – getsocket and setsocket functions – generic socket options – IP socket options – ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP sockets – Domain name system – gethostbyname function – Ipv6 support in DNS – gethostbyadr function – getservbyname and getservbyport functions.

Module-IV

Ipv4 and Ipv6 interoperability – threaded servers – thread creation and termination – TCP echo server using threads – mutex – condition variables – raw sockets – raw socket creation – raw socket output – raw socket input – ping program – trace route program.

References

1. W. Richard Stevens, Unix Network Programming Vol-I, Second Edition, Pearson Education, 1998.
2. Mani Subramaniam, Network Management: Principles and Practice, Addison Wesley, First Edition, 2001.
3. W. Richard Stevens, Fenner, B., Rudoff, A.M., Unix Network Programming – The Sockets Networking API, 3rd edition, Pearson, 2004

4 Richard Stevens, W., Rago, S.A., Programming in the Unix environment, 2nd edition, Pearson, 2005.

Type of Questions for End Semester Exam

PART A

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

CS15-17L1 LANGUAGE PROCESSORS LABORATORY

Course Objectives

To design and implement the different phases in a compiler.
To introduce students to compiler generation tools like LEX and YACC

Course Outcomes

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

1. Implement various models for lexical analysis and syntax analysis using C language
2. Implement lexical analysers and parsers using LEX and YACC
3. Write valid regular expressions for lexical analysis
4. Write valid context free grammar rules for syntax analysis
5. Design and develop a compiler for a new language

1 Creation of Single Pass & Two Pass assembler and macro processor
2 Generation of Lexical Analyzer using tools such as Lex
3 Generation of Parser using tools such as YACC.
4 Generation of LL(1) Parser
5 Generation of intermediate code
6 Creation of type checker
7 Developing a compiler for a subset of a programming language.

References

1. Doug Brown, John Levine, Tony Mason, Lex & yacc, second edition, O'Reilly Media, 1992, ISBN-10: 1565920007 | ISBN-13: 978-1565920002
2. Alfred V aho, Ravi Sethi, Jeffrey D Ullman, Compilers: principles, techniques and tools
3. Hopcroft, J.E, Motwani, R.and Ullman, J.D., Introduction to Automata Theory, Languages, and Computation, Third Edition, ISBN : 978-03-214-5536-9

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.

CS15-17L2 NETWORKS LABORATORY

Course Objectives

To provide basic idea about network components and to design a LAN using structured CAT6 cabling
To provide basic idea to test various data encoding, error management, compression and cryptography algorithms
To simulate various network protocols

Course Outcomes

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

1. Understand the network components and structured cabling
2. Write programs for error detection and correction codes
3. Write programs to test data compression and encryption algorithms
4. Do simulations of various network protocols using network simulator such as ns3

1	Familiarizing computer network components--a)Cables b)Connector c)Switches and Hub d) Router e) Network Cards etc.
2	Structured cabling, Creating VLAN using switches and routers, Experiments on subnetting and supernetting
3	Socket programming--Implement TCP and UDP in UNIX domain, Single chatting program,Multi Chat program using Multithread,Applet chatting
4	Program to test error detection and correction codes
5	Program to test various data compression algorithms
6	Program to test public key and symmetric key cryptography methods
7	Program to test various message digest algorithms
8	Simulations of CSMA / CD , Aloha and Slotted Aloha protocols
9	Simulations to test ARP and RARP
10	Simulation to test CSMA/CA
11	Simulations to test congestion and flow control methods in TCP and UDP
12	Simulations to test various routing protocols
13	Programs using pcap libraries to packet capture and analysis
14	Install and configure various servers- file server,ssh server,web server,database server etc.
15	ACL,firewall and use of "iptables"
16	Design of communication system using GSM, 3G, GPS and RFID modules using Raspberry-pi, Arduino or Edison Board

References

1. Richard Stevens,W., Unix network programming ,The Sockets Networking API,Vol.1,third edition, Addison-Wesley Professional ISBN:9780131411555
2. Douglas E. Comer, Hands-on Networking with Internet Technologies, Pearson Education.
3. Todd Lammle, CCNA: Cisco Certified Network Associate Study Guide,John Wiley and Sons, ISBN:9780470410486
4 Emad Aboelela, Network Simulation Experiments Manual, The Morgan Kaufmann Series in Networking, Elsevier. ISBN:9780123852113
5 Jack L. Burbank, An Introduction to Network Simulator 3(ns3), Wiley-Blackwell. ISBN: 978111815899

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.

GE 15-17L3 ENTREPRENEURSHIP DEVELOPMENT

Course Objectives

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 the 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 Rajeev, Entrepreneurship, Second edition, Oxford Latest Edition, 2011.
2. Gordon, E., & Natarajan, K., Entrepreneurship Development, Fourth edition, Himalaya, 2007.
3. Coulter, Entrepreneurship in Action, Second edition, PHI, 2008.
4. Jain, P.C., Handbook for New Entrepreneur, Oxford University Press, 2003.
5. Khanka, S.S., Entrepreneurial Development, Fifth edition, S. Chand and Co, 2013.

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.

CS15-17L4 PROJECT PHASE I AND 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 the course, the 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 project work shall commence in the seventh semester shall be 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. For those students who are doing real life projects in the industry should also have both an external guide in the industry and an internal guide in the department. The internal guides are responsible for the continuous evaluation.

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.

- Application and feasibility of the project
- Complete and detailed design specifications.
- Block level design documentation
- Detailed design documentation including algorithms/circuits
- Project implementation action plan using standard presentation tools

Guidelines for evaluation:

i) Attendance and Regularity10

ii) Quality and adequacy of design documentation 10

iii) Concepts and completeness of design 10

iv) Theoretical knowledge and individual involvement10

v) Quality and contents of project synopsis 10

Total: 50 Marks

Note: Points (i)-(iii) to be evaluated by the respective project guides and project coordinator

Based on continuous evaluation. (iv)-(v) to be evaluated by the final evaluation team comprising of 3 Internal examiners including the project guide.

CS15-1801 ADVANCED ARCHITECTURE AND PARALLEL PROCESSING

Course Objectives

To design parallel programs and learn how to evaluate their execution
To understand the characteristics, benefits and limitations of parallel systems and distributed infrastructures
To study the technologies enabling parallel computing and the different types of interconnection networks
To identify the different parallel programming models and software support needed for shared memory programming and to learn message passing interface

Course Outcomes

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

1. Well versed with multiprocessor and multi computers
2. Gain in-depth knowledge on parallelism
3. Implement message passing mechanisms
4. Understand memory hierarchy and caching mechanisms
5. Learn pipelining and superscalar technique and 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 technique: 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. Kai Hwang, Naresh Jotwani , Advanced Computer Architecture: Parallelism, Scalability, Programmability, 2/e, McGRaw Hill Education, 2011 ISBN: 978-0-07-070210-3, 0-07-070210-1
2. DezmoSima, Terence Fountain, Peter Karasuk Advanced Computer Architecture – A Design Space approach, Pearson Education, 2012. ISBN: 978-81-317-0208-6
3. Sajjan G. Shiva, Advanced Computer Architecture, CRC Taylor & Francis ,2006 .ISBN: 0-8493-3758—5
4. David E. Culler, Jaswinder Pal Singh, Anoop Gupta, Parallel Computer Architecture, Elsevier, 2000. ISBN: 81-8147-189-X , 1-5586-0343-3
5. Rajaraman, V., Siva Ram Murthy, C., Parallel Computers Architecture and Programming, PHI, New Delhi, 2000, ISBN: 81-203-1621-5
6. Computer Architecture and Parallel Processing by Hwang and Briggs, McGraw Hill.
7. Computer organization and design by Patterson D.A., and Hennessey, J.L., Morgan Kaufmann, 2nd Ed.

Type of Questions for End Semester Exam

PART A

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

CS15-1802 ARTIFICIAL INTELLIGENCE

Course Objectives

To introduce the basic principles, techniques, and applications of artificial Intelligence
To introduce the java framework for building intelligent agents

Course Outcomes

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

1. Gain knowledge in characteristics of software agents and java framework for implementing agents
2. Gain knowledge in important AI techniques and their suitable problem domains
3. Learn knowledge representation and deduction methods
4. Study the important phases in natural language processing
5. Apply the AI principles and techniques to solve problems

Module-I

Software agents – agent characteristics, agent topology, agent oriented programming, Java implementation of intelligent agents.

Module-II

AI domain-Problem Characteristics - Problem spaces and search - Production systems. Heuristic search techniques -Generate and Test - Hill climbing -Best first - A* algorithm. Problem reduction –AO* algorithm, constraint satisfaction - Means Ends analysis. Game playing - Minimax - Alpha-beta cut-off.

Module-III

Logic and Deduction. Introduction to symbolic logic - Propositional logic - Well Formed Formula. Predicate Logic - predicates variables and constants - First order logic, Quantifiers. Forward and backward chaining, Resolution by refutation, Unification. Goal trees.

Module-IV

Representing Knowledge: Procedural versus Declarative. Reasoning under uncertainty: Non Monotonic reasoning –support lists and dependency directed backtracking - Statistical reasoning- Bayes theorem. Bayesian networks. Fuzzy Logic, Semantic Nets, Frames, Conceptual Dependency, Scripts, CYC. Natural Language Processing - Transformational grammar, Case grammar -Semantic grammars. Learning: Rote learning, Learning, Types of learning.

References

1. Elaine Rich and Kevin Knight, Artificial Intelligence, Tata McGraw-Hill Publishing Company Ltd., New Delhi, Third Edition, ISBN: 13:978-0-07-008770-5, 2010. (Modules 2,3,4)

2. Jeffrey M. Bradshaw, Software Agents, AAAI Press/ The MIT Press(1997)(Module 1), ISBN: 0-262-52234-9
3. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice Hall India Ltd., New Delhi, 2009, ISBN: 81-203-0777-1 (modules 2,3,4).
4. Padhy, N.P., Artificial intelligence and intelligent systems, 2010, 0-19-567154-6.
5. Jurafsky D., Martin J.H., Speech and natural language processing, Prentice Hall, 2003

Type of Questions for End Semester Exam

PART A

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

CS15-1803 DISTRIBUTED COMPUTING

Course Objectives

To understand the major tools and techniques that allow programmers to effectively program the parts of the code that require substantial communication and synchronization

To study the core ideas behind modern coordination and communication paradigms and distributed data structures

To introduce a variety of methodologies and approaches for reasoning about concurrent and distributed programs realizing not only the basic principles but also the best practice engineering techniques of concurrent and distributed computing

To present techniques to formally study the safety and progress properties of concurrent and distributed algorithms

Course Outcomes

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

1. Distinguish the theoretical and conceptual foundations of distributed computing
2. Recognise the inherent difficulties that arise due to use of computing resources without the distribution
3. Recognise the feasibilities and issues of resource management in distributed environment
4. Identify the problems in developing distributed applications

Module-I

Characterization of Distributed systems – Introduction - Examples of Distributed Systems – Challenges - System Models – Architectural models - Fundamental Models – Interprocess communication - The API for the Internet protocols - External Data representation and Marshalling - Client Server Communication - Group communication. Interprocess communication in UNIX. Distributed Objects and Remote Invocation – Communication between distributed objects - Remote Procedure Call - Events and Notifications - Case Study - Java RMI.

Module-II

Operating System Support-The Operating system layer – Protection- Processes and Threads-Operating System architecture.

Distributed file Systems-Introduction-File Service architecture– Case study Sun NFS. Name services and Domain Name System – Directory Services.

Module-III

Time and coordination. Synchronizing physical clocks -logical time and logical clocks. Distributed coordination –distributed mutual exclusion – elections. Replication – basic architectural model – consistency and request ordering.

Module-IV

Distributed DBMS Architecture- Distributed Database Design –Query Decomposition and Data Localization-Distributed transactions – concurrency control in distributed transactions– distributed deadlocks –transaction recovery.

References

1. George Coulouris, Jean Dollimore, Tim Kindberg, Distributed Systems – Concepts and Design, Fourth Edition, Pearson Education, 2011. ISBN 978-81-317-1840-7
2. Sunita Mahajan, Seema Shah, Distributed Computing, Oxford University Press, 2010. ISBN: 0-19-806186-2.
3. Andrew S. Tanenbaum, Distributed Operating Systems, Pearson Education, 2011. ISBN 978-81-7758-179-9.
4. Randy Chow, Theodore Johnson, Distributed Operating Systems and Algorithm Analysis, Pearson Education, 2011. ISBN 978-81-317-2859-8.
5. TamerOzsu, M., Patrick Valduriez, Principles of Distributed Database Systems, Second Edition, Pearson Education.

Type of Questions for End Semester Exam

PART A

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

CS15-1804E1 SOFTWARE TESTING

Course Objectives

To learn the different aspects of software testing
To gain in-depth knowledge of different types of black box and white box testing
To study how to integrate a system and different types of integration
To understand about testing tools and test case design
To have a basic understanding of software test automation

Course Outcomes

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

1. Understand the testing process
2. Gain experience on how to find practical solutions to problems
3. Get exposure to work independently as well as in teams
4. Define, formulate and analyse a problem using different test strategies

Module-I

Introduction: Faults, Errors and Failures, Basics of software testing, Testing objectives, Principles of testing, Requirements, behavior and correctness, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software Quality and Reliability, Software defect tracking.

Module-II

White Box And Black Box Testing: White box testing, static testing, static analysis tools, Structural testing: Unit/Code functional testing, Code coverage testing, Code Complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/graph based testing, Model based testing and model checking, Differences between white box and Black box testing.
Case Study: Functional testing using Selenium may be given as assignment

Module-III

Integration, System, And Acceptance Testing: Top down and Bottom up integration, Bi-directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non -functional testing, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution.
Case Study: Structural Testing using TestComplete may be given as assignment

Module-IV

Test Selection & Minimization For Regression Testing: Regression testing, Regression test process, Initial smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic slicing, Test Minimization, tools for regression testing, Adhoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding, Test planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection, Testing in Object Oriented systems.

References

1. S.Desikan and G. Ramesh, Software Testing: Principles and Practices, First edition, Pearson Education, ISBN:978-8-17-758121-8.
2. Aditya P. Mathur, Fundamentals of Software Testing, First edition, Pearson Education, ISBN: 81-317-0795-4
3. Naik and Tripathy, Software Testing and Quality Assurance, First edition, Wiley, ISBN: 978-0-47-178911-6

Type of Questions for End Semester Exam

PART A

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

CS15-1804E2 BIG DATA ANALYTICS

Course Objectives

To understand the basics of various big data technologies
To understand the basics of the cloud platform
To understand the various components in Hadoop and MapReduce programming model
To have a basic overview of Apache spark and its comparison with other technologies

Course Outcomes

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

1. Explain the various state of the art big data technologies
2. Learn the architecture of Hadoop and spark
3. Develop programs using Map Reduce programming model

Module-I

Data mining concepts, Applications of data mining, Stages of data mining-types of data mining applications -Data pre-processing- - data normalization, data transformation- data reduction-Web mining and text mining- case studies

Module-II

Introduction to cloud computing: Differences between cloud, cluster and grid. Cloud computing fundamentals, public vs. private clouds, Types of cloud services-PaaS, SaaS, IaaS, Examples for each service. Role of virtualization in enabling the cloud, Application Development: Service creation environments to develop cloud based applications. Development environments for service development: Amazon, Azure, Google App-Social network analysis-Tools and applications-Examples

Module-III

Introduction to Big Data: MapReduce Basics: Functional Programming Roots, Mappers and Reducers, The Execution Framework, Partitioners and Combiners, The Distributed File System, Hadoop Cluster Architecture, A word count example with MapReduce.

MapReduce Algorithm Design: Local Aggregation, Combiners and In-Mapper Combining, Algorithmic Correctness with Local Aggregation, Pairs and Stripes, Computing Relative Frequencies, Secondary Sorting, Relational Joins

Module-IV

Big Data and Hadoop: Introduction to Hadoop Distributed File System, Hadoop ecosystem, MapReduce Implementation with Hadoop, Big Data Management Tools: PIG: Pig's Data Model, HIVE: Hive Architecture, HIVEQL, HBASE: MapReduce Integration, ZooKeeper, SQOOP. Introduction to Spark and

its architecture. Comparison of Hadoop with spark.

References

1. Jimmy Lin and Chris Dyer, Morgan & Claypool, Data-Intensive Text Processing with Map Reduce, Synthesis Lectures, 2010, ISBN 978-16-08453-42-9.
2. Anthony T. Velte, Toby J. Velte, Elsenpeter, R., Cloud Computing a practical approach, Tata McGraw-HILL, 2010, ISBN 978-00-70683-51-8.
3. Jiawei Han & Micheline Kamber, Morgan Kaufmann, Data Mining – Concepts and Techniques - Publishers, Elsevier,2nd Edition, 2006, ISBN:978-93-80931-91-3.
4. Ian H.Witten, Frank, E., Hall, M.A., Data mining-Practical machine learning tools and techniques, Third edition, Elsevier Publications, ISBN: 978-93-80501-86-4.
5. Margaret H. Dunham and Sridhar, S., Data Mining: Introductory and Advanced Topics , First edition, Pearson Education, ISBN: 978-81-77587-85-2.
6. Sudheep Elayidom, M., Data mining and warehousing, Cengage learning, 2015, ISBN: 978-81-315-2586-9.

7 Karau, H. et.al, Learning Spark: lightning-fast big data analysis , OReilly Publishers

8 Tom White, Hadoop: The definitive guide, 4th edition, O'Reilly Publishers

Type of Questions for End Semester Exam

PART A

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

CS15-1804E3 CLOUD COMPUTING

Course Objectives

To provide an overview on cloud computing and its related architectures, virtualization, cloud infrastructure, security and various programing models used in cloud development
To focus on real world cloud deployments, along with various providers for cloud
To analyse various programming tools and methods used in cloud computing architectures

Course Outcomes

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

1. Analysis various aspects of cloud computing
2. Gain in-depth knowledge in cloud architecture
3. Gain knowledge of cloud visualization concepts
4. Get basic understanding of cloud security
5. Study different Cloud Infrastructure
6. Understand various cloud implementations including private and public clouds
7. Understand commonly used cloud programming models

Module-I

Cloud Computing: History of Cloud Computing - Cloud Computing definition, private, public and hybrid cloud. Cloud types : IaaS, PaaS, SaaS - Cloud Architecture - Cloud Storage - Why Cloud Computing Matters - Advantages of Cloud Computing - Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud - Disadvantages of Cloud Computing - Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery - Companies in the Cloud Today - Cloud Services - Next generation Cloud Applications.

Module-II

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

Module-III

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development - Design Challenges - Inter Cloud Resource Management - Resource Provisioning and Platform Deployment - Global Exchange of Cloud Resources.

Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security - Risk Management - Security Monitoring - Security Architecture Design - Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security.

Module-IV

Web-Based Application - Pros and Cons of Cloud Service Development - Types of Cloud Service Development - Software as a Service - Platform as a Service - Web Services - On-Demand Computing - Discovering Cloud Services Development Services and Tools - Amazon EC2 - Google App Engine , Windows Azure. Programming Support - Google App Engine, Amazon AWS, Windows Azure - Cloud Software Environments - Eucalyptus, Opennebula, OpenStack, Aneka, CloudSim.

References

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2012.
2. John W. Rittinghouse and James F. Ransome, Cloud Computing: Implementation, Management,and Security, CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach, TMH,2009.
4. Kumar Saurabh, Cloud Computing – insights into New-Era Infrastructure,Wiley India,2011.
5. George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud O'Reilly.
6. James E. Smith, Ravi Nair, Virtual Machines: Versatile Platforms for Systems and Processes ,Elsevier/Morgan Kaufmann, 2005.
7. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, Grid and Cloud Computing – A Business Perspective on Technology and Applications, Springer.
8. Ronald L. Krutz, Russell Dean Vines, Cloud Security – A comprehensive Guide to Secure Cloud Computing, Wiley – India, 2010.
9. Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, S., Mastering Cloud Computing, TMGH,2013.
10. Gautam Shroff, Enterprise Cloud Computing, Cambridge University Press,2011.
11. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
12. Kumar Saurabh, Cloud Computing – Insights into New Era Infrastructure, Wiley Indian Edition,2011.
13. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On Demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
14. Nick Antonopoulos, Cloud computing, Springer Publications, 2010.

Type of Questions for End Semester Exam

PART A

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

CS15-1804 E4 AGENT BASED INTELLIGENT SYSTEMS

Course Objectives

To provide introduction to the basic knowledge representation, problem solving, and learning methods of artificial intelligence required by agents

Course Outcomes

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

1. Explain the algorithmic and theoretical foundation of agents and multi agent systems
2. Create logical agents to do inference using first order logic
3. Apply Bayesian networks for probabilistic reasoning.

Module-I

Introduction: Definitions – Foundations – History – Intelligent Agents – Problem Solving –Searching – Heuristics – Constraint satisfaction Problems – Game Playing. Knowledge representation and reasoning: Logical agents – First order logic – First Order Inference – Unification – Chaining –Resolution Strategies – Knowledge Representation – Objects – Actions – Events.

Module-II

Planning Agents: Planning Problem – State Space Search – Partial Order Planning _Graphs – No deterministic Domains – Conditional Planning – continuous Planning – Multiagent Planning

Module-III

Agents And Uncertainty: Acting under uncertainty – Probability Notation – Bayes Rule and use – Bayesian Networks – Other approaches – Time and Uncertainty – Temporal Models – Utility Theory – Decision Network – Complex Decisions

Module-IV

Higher Level Agents: Knowledge in Learning – Relevance information –Statistical Learning Methods – Reinforcement Learning – Communication – Formal Grammar – Augmented Grammars- Future of AI.

References

1. Stuart Russell and Peter Norvig, Artificial Intelligence – A Modern Approach. 3rd Edition, Prentice Hall, 2009
2. Michael Wooldridge, An Introduction to Multi Agent System, 2nd Edition, John Wiley,. ISBN: 978-0-470-51946-2.
3. Winston, Patrick Henry, Artificial intelligence, Addison Wesley ,2008

Type of Questions for End Semester Exam

PART A

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

CS15-1804E5 REAL TIME SYSTEMS

Course Objectives

To understand the fundamental concepts of real-time systems
To appreciate the use of multitasking techniques in real-time systems
To understand the features and structures of practical implementations
To appreciate how application areas impact RTOS facilities

Course Outcomes

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

1. Understand the characteristics and applications of real-time systems
2. Understand the details of real-time scheduling policies
3. Understand the details about RTOS
4. Understand the details of real-time communication
5. Understand the details of real-time database and its applications

Module-I

Introduction to real time-applications of real time systems-a basic model of real time systems-characteristics of real time systems-safety and reliability.types of real time task-timing constraints-Modeling Timing Constraints.

Real-Time task scheduling-concepts, types and characteristics-task scheduling-clock driven scheduling - hybrid schedulers-event driven scheduling-earliest deadline first (EDF) scheduling- Rate Monotonic Algorithm (RMA)-Issues with RMA-Issues in Using RMA in practical solutions.

Module-II

Handling resource sharing and dependencies among real-time tasks-priority inversion-priority inheritance protocol(PIP)-highest locker protocol(HLP)-priority ceiling protocol(PCP)-different types of priority inversions under PCP-important features of PCP-issues in resource in resource sharing protocol-handling task dependencies.

Scheduling real-time tasks in multiprocessor and distributed systems-multiprocessor task allocation-dynamic allocation of task-fault tolerant scheduling of task-clocks in distributed real-time systems-centralized and distributed clock synchronization.

Module-III

Commercial Real-Time OS-time services-features of RTOS-unix as RTOS- unix based RTOS-windows as RTOS-POSIX-benchmarking real-time systems.

Module-IV

Real time communication-concepts-real-time communication in a LAN-soft real-time communication in a LAN-hard real-time communication in a LAN-bounded access protocols for LAN-real time communication over packet switched networks-QoS framework-routing-resource reservation-rate control-QoS models. Real-time databases- application of real-time database-characteristics of temporal data-concurrency control in real-time databases-commercial real-time databases.

References

1. Rajib Mall, Real-Time systems: Theory and Practice ,Pearson Education India, ISBN 9788131700693
2. Hermann Kopetz, Real-Time Systems: Design Principles for Distributed Embedded Applications, Springer Science and Business media ,ISBN 9781441982377
3. Jane W S Liu, Real-time Systems, Pearson Education India, ISBN 9780130996510
4. Qing Li and Caroline Yao "Real-Time Concepts for Embedded Systems" CMP Books; 1st edition (July 2003) ISBN-13: 978-1578201242
5. Rob Williams "Real-Time Systems Development" BUTTERWORTH HEINEMANN(2005) ISBN-13: 978-0-7506-6471-4

Type of Questions for End Semester Exam

PART A

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

CS15-18L1 SEMINAR

Course Objectives

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 the 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 Computers either hardware or software. 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.

CS15-18L2 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 the course, the 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.

Presentation of the work

Oral Examination

Demonstration of the project against design specifications

Quality and content of the project report

Guidelines for evaluation:

(i) Regularity and progress of work	40
(ii) Work knowledge and Involvement	40
(iii) End semester presentation and oral examination	40
(iv) Level of completion and demonstration of functionality/specifications	40
(v) Project Report – Presentation style and content	40
	Total 200 marks

Note: Points (i) and (ii) to be evaluated by the respective project guide and the project coordinator based on continuous evaluation. (iii)-(v) to be evaluated by the final evaluation team .

CS15-18L3 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 the 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 Head of the Department / Division or his/her nominee and one senior faculty of the Department/Division and an external expert. The examination panel should be 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.