UNIVERSITY OF KERALA

B. Tech Degree Course
In
Information Technology

Scheme and Syllabus
(2008 scheme)

UNIVERSITY OF KERALA

B.Tech Degree Course – 2008 Scheme

REGULATIONS

1. Conditions for Admission

Candidates for admission to the B.Tech degree course shall be required to have passed the Higher Secondary Examination, Kerala or 12th Standard V.H.S.E., C.B.S.E., I.S.C. or any examination accepted by the university as equivalent thereto obtaining not less than 50% in Mathematics and 50% in Mathematics, Physics and Chemistry/ Bio- technology/ Computer Science/ Biology put together, or a diploma in Engineering awarded by the Board of Technical Education, Kerala or an examination recognized as equivalent thereto after undergoing an institutional course of at least three years securing a minimum of 50 % marks in the final diploma examination subject to the usual concessions allowed for backward classes and other communities as specified from time to time.

2. Duration of the course

i) The course for the B.Tech Degree shall extend over a period of four academic years comprising of eight semesters. The first and second semester shall be combined and each semester from third semester onwards shall cover the groups of subjects as given in the curriculum and scheme of examination.

ii) Each semester shall ordinarily comprise of not less than 400 working periods each of 60 minutes duration.

iii) A candidate who could not complete the programme and pass all examinations within Ten (10) years since his first admission to the B.Tech programme will not be allowed to continue and he has to quit the Programme. However he can be readmitted to the first year of the programme if he/she satisfies the eligibility norms applicable to the regular candidates prevailing at the time of readmission.

3. Eligibility for the Degree

Candidates for admission to the degree of bachelor of technology shall be required to have undergone the prescribed course of study in an institution maintained by or affiliated to the University of Kerala for a period of not less than four academic years and to have passed all the examinations specified in the scheme of study

4. Subjects of Study

The subjects of study shall be in accordance with the scheme and syllabi prescribed

5. Evaluation

Candidates in each semester will be evaluated both by continuous assessment and end semester University examination. The individual maximum marks allotted for continuous assessment and University examination for each subject is as prescribed by the scheme of study.

5.1 Continuous Assessment (C.A)

The marks awarded for the continuous assessment will be on the basis of the day-to-day work, periodic tests (minimum two in a semester) and assignments (minimum of three – one each from each module). The faculty member concerned will do the continuous assessment for each semester. The C.A. marks for the individual subjects shall be computed by giving weight age to the following parameters.

Subject	**Attendance**	**Tests**	**Assignments/ Class Work**
Theory Subjects	20%	50%	30%
Drawing	20%	40%	40%
Practical	20%	40%	40%
Project Work	Work Assessed by Guide – 50% Assessed by a three member committee out of which one member is the guide – 50%		

The C.A. marks for the attendance (20%) for each theory, practical and drawing shall be awarded in full only if the candidate has secured 90% attendance or above in the subject. Proportionate reduction shall be made in the case of subjects in which he/she gets below 90% of the attendance for a subject. The CA marks obtained by the student for all subjects in a semester is to be published at least 5 days before the commencement of the University examinations. Anomalies if any may be scrutinized by the department committee and the final CA marks are forwarded to the university within the stipulated time.

5.2. End Semester University Examinations

i) There will be University examinations at the end of the first academic year and at the end of every semester from third semester onwards in subjects as prescribed under the respective scheme of examinations. Semester classes shall be completed at least 10 working days before the commencement of the University examination.

ii) The examination will be held twice in a year – April/May session (for even semester) and October/November session (for odd semester). The combined 1st and 2nd semester is reckoned as equivalent to an even semester for the purpose of conduct of examination and the University examination will be held during April/May. However VII and VIII Semester examination will be conducted in both the sessions. This schedule will not be changed.

iii) A student will be permitted to appear for the university examination only if he/she satisfies the following requirements

   a. He/she must secure not less than 75% attendance in the total number of working periods during the first year and in each semester thereafter and shall be physically present for a minimum of 60% of the total working periods. In addition, he/she also shall be physically present in at least 50% of total working periods for each subject
   b. He must earn a progress certificate from the head of the institution of having satisfactorily completed the course of study in the semester as prescribed by these regulations
   c. It shall be open to the Vice-Chancellor to grant condonation of shortage of attendance on the recommendation of the head of the institution in accordance with the following norms

d. The attendance shall not be less than 60% of the total working periods
e. He/she shall be physically present for a minimum of 50% of the total working periods
f. The shortage shall not be condoned more than twice during the entire course
g. The condonation shall be granted subject to the rules and procedures prescribed by the university from time to time.
h. The condonation for combined 1st and 2nd semesters will be reckoned as a single condonation for attendance purposes.

iv) A student who is not permitted to appear for the University examinations for a particular semester due to the shortage of attendance and not permitted by the authorities for condonation of shortage of attendance shall repeat the semester when it is offered again. This provision is allowed only once for a semester.

v) The university will conduct examinations for all subjects (Theory, Drawing & Practical)

vi) The scheme of valuation will be decided by the chief examiner for theory / drawing subjects

vii) For practical examinations, the examiners together will decide the marks to be awarded. The student shall produce the certified record of the work done in the laboratory during the examination. The evaluation of the candidate should be as per the guidelines given in the syllabus for the practical subject.

6. Letter Grades

For each subject in a semester, based on the total marks obtained by the student in the University examination and Continuous assessment put together a letter grade (S,A+, A, B+, B, C+, C, D, E and F) will be awarded. ***All letter grades except 'F' will be awarded if the marks for the University examination is 40 % or above and the total mark (C.A marks + University Exam mark) is 50 % or above***. No absolute mark will be indicated in the grade card. Letter grade corresponding to total marks (C.A marks+ University Exam mark) and the corresponding grade point in a ten-point scale is described below.

% of Total marks *(C.A marks + University Exam mark)*	**Letter Grade**	**Grade Point (G.P)**	**Remarks**
90 % and above	S	10	Excellent
85 % and above but less than 90%	A+	9	
80 % and above but less than 85%	A	8.5	
75 % and above but less than 80%	B+	8	
70 % and above but less than 75%	B	7.5	
65 % and above but less than 70%	C+	7	
60 % and above but less than 65%	C	6.5	
55 % and above but less than 60%	D	6	
50 % and above but less than 55%	E	5.5	
Below 50% (C.A + U.E) or below 40 % for U.E only	F	0	Failed

7. Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

Grade point average is the semester wise average points obtained by each student in a 10-point scale. GPA for a particular semester is calculated as per the calculation shown below.

$$GPA = \frac{\sum Credit \times \text{GP obtained for the subject}}{\sum \text{credit for subject}}$$

Cumulative Grade point Average (CGPA) is the average grade points obtained by the students till the end of any particular semester. CGPA is calculated in a 10-point scale as shown below.

$$\text{CGPA} = \frac{\sum \text{Credits for semester} \times \text{GPA obtained for the semester}}{\sum \text{credits for the semester}}$$

GPA and CGPA shall be rounded to two decimal points. The Grade card issued to the students shall contain subject number and subject name, credits for the subject, letter grades obtained, GPA for the semester and CGPA up to that particular semester. In addition to the grade cards for each semester all successful candidate shall also be issued a consolidated statement grades. On specific request from a candidate and after remitting the prescribed fees the University shall issue detailed mark to the individual candidate.

8. Minimum for a pass

a. A candidate shall be declared to have passed a semester examination in full in the first appearance if he/she secures not less than 5.5 GPA with a minimum of 'E' grade for the all individual subject in that semester.
b. A candidate shall be declared to have passed in an individual subject of a semester examination if he/she secures grade 'E' or above.
c. A candidate who does not secure a full pass in a semester examination as per clause (a) above will have to pass in all the subjects of the semester examination as per clause (b) above before he is declared to have passed in that semester examination in full.

9. Improvement of Grades

i) A candidate shall be allowed to re-appear for a maximum of two subjects of a semester examination in order to improve the marks and hence the grades already obtained subject to the following conditions

a. The candidate shall be permitted to improve the examination only along with next available chance.
b. The candidate shall not be allowed to appear for an improvement examination for the subjects of the VII & VIII semesters
c. The grades obtained by the candidate for each subject in the improvement chance he has appeared for or the already existing grades – whichever is better will be reckoned as the grades secured.
d. First & Second semester will be counted as a single chance and they can improve a maximum of three subjects

ii) A candidate shall be allowed to repeat the course work in one or more semesters in order to better the C.A. marks already obtained, subject to the following conditions

a. He/she shall repeat the course work in a particular semester only once and that too at the earliest opportunity offered to him/her.
b. He/she shall not combine this course work with his/her regular course work
c. He/she shall not be allowed to repeat the course work of any semester if he has already passed that semester examination in full
d. The C.A marks obtained by the repetition of the course work will be considered for all purposes

iii) A candidate shall be allowed to withdraw from the whole examination of a semester in accordance with the rules for cancellation of examination of the University of Kerala.

10. Classification of Successful candidates

i) A candidate who qualifies for the degree passing all the subjects of the eight semesters within five academic years (ten consecutive semesters after the commencement of his/her course of study) and secures not less than 8 CGPA up to and including eighth semester (overall CGPA) shall be declared to have passed the B.Tech degree examination in FIRST CLASS WITH DISTINCTION

ii) A candidate who qualifies for the degree passing all the subjects of the eight semesters within five academic years (ten consecutive semesters after the commencement of his/her course of study) and secures less than 8 CGPA but not less than 6.5 CGPA up to and including eighth semester shall be declared to have passed the B.Tech degree examination in FIRST CLASS.

iii) All other successful candidates shall be declared to have passed the B.Tech Degree examination in SECOND CLASS

iv) Successful candidates who complete the examination in four academic years (Eight consecutive semesters after the commencement of the course of study shall be ranked branch-wise on the basis of the CGPA in all eight semesters put together. In the case of a tie in the CGPA the total marks of the students who have got same CGPA shall be considered for finalizing the rank. Students who pass the examination in supplementary examination are also covered under this clause

11. Educational Tour

a. The students may undertake one educational tour preferably after fourth semester of the course and submit a tour report
b. The tour may be conducted during the vacation / holidays taking not more than 5 working days, combined with the vacation / holidays if required. Total number of Tour days shall not exceed 15 days.
c. The tour period shall be considered as part of the working periods of a semester

12. Revision of Regulations

The university may from time to time revise, amend or change the regulations, curriculum, scheme of examinations and syllabi. These changes unless specified otherwise, will have effect from the beginning of the academic year / semester following the notification of the University

INFORMATION TECHNOLOGY

SCHEME OF STUDIES AND EXAMINATION
FOR B. TECH DEGREE - 2008 ADMISSION

COMBINED I AND II SEMESTERS (*COMMON FOR ALL BRANCHES*)

Course Code	Subject	Hours / Week			Maximum Sessional Marks	University Exams		Credits
		L	T	D/P		Hours	Maximum Marks	
08.101	Engineering Mathematics	2	1	0	50	3	100	6
08.102	Engineering Physics	2	1	0	50	3	100	6
08.103	Engineering Chemistry	2	1	0	50	3	100	6
08.104	Engineering Graphics	1	0	2	50	3	100	6
08.105	Engineering Mechanics	2	1	0	50	3	100	6
08.106	Basic Civil Engineering	2	1	0	50	3	100	6
08.107	Basic Mechanical Engineering	2	1	0	50	3	100	6
08.108	Basic Electrical and Electronics Engineering	2	1	0	50	3	100	6
08.109	Basic Communication and Information Engineering	2	1	0	50	3	100	6
08.110	Engineering Workshops	0	0	2	50	3	100	4
Total		17	8	4	500		1000	58
Total Marks		**1500**						

The subject 08.109 shall be handled by the Department of Electronics and Communication Engineering,

SEMESTER III		Hours / Week			Maximum Sessional Marks	University Exams		Credits
Course Code	Subject	L	T	D/P		Hours	Maximum Marks	
08.301	Engineering Mathematics II (CMPUNERFTAHB)	3	1	0	50	3	100	4
08.302	Problem Solving and Programming in C(R F)	2	2	0	50	3	100	4
08.303	Discrete Structures(R F)	2	1	0	50	3	100	3
08.304	Electronic Circuits (R F)	2	1	0	50	3	100	3
08.305	Digital System Design (R F)	2	2	0	50	3	100	4
08.306	Computer Organization (R F)	2	1	0	50	3	100	3
08.307	Electronic Circuits Lab (R F)	0	0	4	50	3	100	4
08.308	Programming Lab (R F)	0	0	4	50	3	100	4
Total		**13**	**8**	**8**	**400**		**800**	**29**
Total Marks		**1200**						

SEMESTER IV		Hours / Week			Maximum Sessional Marks	University Exams		Credits
Course Code	Subject	L	T	D/P		Hours	Maximum Marks	
08.401	Engineering Mathematics III (CMPUNERFHB)	3	1	0	50	3	100	4
08.402	Humanities (CRFTAHB)	3	0	0	50	3	100	3
08.403	Microcontroller-based Design	3	1	0	50	3	100	4
08.404	Object Oriented Techniques (R F)	2	1	0	50	3	100	3
08.405	Data Structures and Algorithms (R F)	2	2	0	50	3	100	4
08.406	Database Design	3	0	0	50	3	100	3
08.407	Data Structures Lab (R F)	0	0	4	50	3	100	4
08.408	Object Oriented Programming Lab	0	0	4	50	3	100	4
Total		**16**	**5**	**8**	**400**		**800**	**29**
Total Marks		**1200**						

SEMESTER V		Hours / Week			Maximum Sessional Marks	University Exams		Credits
Course Code	Subject	L	T	D/P		Hours	Maximum Marks	
08.501	Engineering Mathematics IV (ERFBH)	3	1	0	50	3	100	4
08.502	Advanced Mathematics & Queueing Models (RF)	3	1	0	50	3	100	4
08.503	Theory of Computation	2	1	0	50	3	100	3
08.504	Systems Programming (RF)	2	1	0	50	3	100	3
08.505	Operating Systems	3	1	0	50	3	100	4
08.506	Data Communication	2	1	0	50	3	100	3
08.507	Digital Circuits Lab	0	0	4	50	3	100	4
08.508	Database Lab	0	0	4	50	3	100	4
Total		**15**	**6**	**8**	**400**		**800**	**29**
Total Marks		**1200**						

SEMESTER VI		Hours / Week			Maximum Sessional Marks	University Exams		Credits
Course Code	Subject	L	T	D/P		Hours	Maximum Marks	
08.601	Compiler Design (RF)	3	1	0	50	3	100	4
08.602	Computer Networks	2	1	0	50	3	100	3
08.603	Software Architecture	2	1	0	50	3	100	3
08.604	Internet Technology	3	1	0	50	3	100	4
08.605	Computer Graphics	2	1	0	50	3	100	3
08.606	Embedded Systems	3	1	0	50	3	100	4
08.607	Internet Lab	0	0	4	50	3	100	4
08.608	Computer Graphics Lab	0	0	4	50	3	100	4
Total		**15**	**6**	**8**	**400**		**800**	**29**
Total Marks		**1200**						

SEMESTER VII		Hours / Week			Maximum Sessional Marks	University Exams		Credits
Course Code	Subject	L	T	D/P		Hours	Maximum Marks	
08.701	Software Project Management	2	1	0	50	3	100	3
08.702	Internetworking	3	1	0	50	3	100	4
08.703	Cryptography	2	1	0	50	3	100	3
08.704	Web Applications Development	2	1	0	50	3	100	3
08.705	Elective I	3	1	0	50	3	100	4
08.706	Elective II	3	1	0	50	3	100	4
08.707	Computer Networks Lab	0	0	4	50	3	100	4
08.708	Seminar / Project Design	0	0	4	100	3		4
Total		**15**	**6**	**8**	**450**		**700**	**29**
Total Marks		**1150**						

SEMESTER VIII		Hours / Week			Maximum Sessional Marks	University Exams		Credits
Course Code	Subject	L	T	D/P		Hours	Maximum Marks	
08.801	Mobile Computing	3	1	0	50	3	100	4
08.802	E-Commerce	3	0	0	50	3	100	3
08.803	E-Security	2	1	0	50	3	100	3
08.804	Software Testing	2	1	0	50	3	100	3
08.805	Elective III	3	1	0	50	3	100	4
08.806	Elective IV	3	1	0	50	3	100	4
08.807	Web Applications Lab	0	0	4	50	3	100	4
08.808	Project & Viva Voce	0	0	4	100	3	100	4
Total		**16**	**5**	**8**	**450**		**800**	**29**
Total Marks		**1250**						

Elective I (08.705)	
A	Design and Analysis of Algorithms
B	Simulation and Modelling
C	Principles of Programming Languages
D	Communicative English & Technical Writing **(Common with 08.704(3) of CSE)**
Elective II (08.706)	
A	Computer Peripherals and Interfacing
B	Optimization Techniques
C	Data Mining Techniques **(Common with 08.705(4) of CSE)**
Elective III (08.805)	
A	Advanced Microprocessors
B	Network Programming
C	Graph Theory **(Common with 08.805(4) of CSE)**
Elective IV (08.806)	
A	Soft Computing
B	Distributed Systems
C	Web Services

08.101 ENGINEERING MATHEMATICS- I

L-T-P : 2-1-0 **Credits: 6**

MODULE- 1

Applications of differentiation:– Definition of Hyperbolic functions and their derivatives- Successive differentiation- Leibnitz' Theorem(without proof)- Curvature- Radius of curvature- centre of curvature- Evolute (Cartesian ,polar and parametric forms)

Partial differentiation and applications:- Partial derivatives- Euler's theorem on homogeneous functions- Total derivatives- Jacobians- Errors and approximations- Taylor's series (one and two variables) - Maxima and minima of functions of two variables - Lagrange's method- Leibnitz rule on differentiation under integral sign.

Vector differentiation and applications :- Scalar and vector functions- differentiation of vector functions-Velocity and acceleration- Scalar and vector fields- Operator ∇ - Gradient- Physical interpretation of gradient- Directional derivative- Divergence- Curl- Identities involving ∇ (no proof) - Irrotational and solenoidal fields – Scalar potential.

MODULE-II

Laplace transforms:- Transforms of elementary functions - shifting property- Inverse transforms- Transforms of derivatives and integrals- Transform functions multiplied by t and divided by t - Convolution theorem(without proof)-Transforms of unit step function, unit impulse function and periodic functions-second shifiting theorem- Solution of ordinary differential equations with constant coefficients using Laplace transforms.

Differential Equations and Applications:- Linear differential eqations with constant coefficients- Method of variation of parameters - Cauchy and Legendre equations – Simultaneous linear equations with constant coefficients- Application to orthogonal trajectories (cartisian form only).

MODULE-III

Matrices:-Rank of a matrix- Elementary transformations- Equivalent matrices- Inverse of a matrix by gauss-Jordan method- Echelon form and normal form- Linear dependence and independence of vectors- Consistency- Solution of a system linear equations-Non homogeneous and homogeneous equations- Eigen values and eigen vectors – Properties of eigen values and eigen vectors- Cayley Hamilton theorem(no proof)- Diagonalisation- Quadratic forms- Reduction to canonical forms-Nature of quadratic forms- Definiteness,rank,signature and index.

REFERENCES

1. Kreyszig; *Advanced Engineering Mathematics*, 8th edition, Wiley Eastern.
2. Peter O' Neil ; *Advanced Engineering Mathematics,* Thomson
3. B.S.Grewal ; *Higher Engineering Mathematics,* Khanna Publishers
4. B.V.Ramana*; Higher Engineering Mathematics,* Tata Mc Graw Hill, 2006
5. Michel D Greenberg; *Advanced Engineering Mathematics,*Pearson International
6. Sureshan J, Nazarudeen and Royson; *Engineering Mathematics I*, Zenith Publications

08.102 ENGINEERING PHYSICS

L-T-P : 2-1- 0 **Credits: 6**

MODULE-I

Oscillations and Waves : Basic ideas of harmonic oscillations – Differential equation of a SHM and its solution. Theory of damped harmonic oscillations. Quality factor. Theory of forced harmonic oscillations and resonance. Types of waves. One dimensional waves – Differential Equation. Harmonic waves. Three dimensional waves - Differential Equation and solution. Plane waves and spherical waves. Energy in wave motion. Velocity of transverse waves along a stretched string.

Electromagnetic Theory : Del operator – grad, div, curl and their physical significance. Concept of displacement current. Deduction of Maxwell's equations. Prediction of electromagnetic waves. Transverse nature of electromagnetic waves. **E** and **H** are at right angles. Poynting's theorem (qualitative only)

Physics of Solids: Space lattice. Unit cell and lattice parameters. Crystal systems. Co-ordination number and packing factor with reference to simple cubic, body centered cubic and face centered cubic crystals. Directions and planes. Miller indices. Interplanar spacing in terms of Miller indices. Super conductivity - Meissner effect. Type-I and Type-II superconductors. BCS theory (qualitative). High temperature superconductors. Applications of superconductors. Introduction to new materials (qualitative) -Metallic glasses, Nano materials, Shape memory alloys, Bio materials.

MODULE- II

Interference of Light: Concept of temporal and spatial coherence. Interference in thin films and wedge shaped films. Newton's rings. Michelson's interferometer. Determination of wave length and thickness. Interference filters. Antireflection coating.

Diffraction of Light : Fresnel and Fraunhofer diffraction. Fraunhofer diffraction at a single slit. Fraunhofer diffraction at a circular aperture (qualitative). Rayleigh's criterion for resolution. Resolving power of telescope and microscope. Plane transmission grating. Resolving power of grating. Grating equation. X-ray diffraction. Bragg's law.

Polarization of Light : Types of polarized light. Double refraction. Nicol Prism. Retardation plates. Theory of plane, circular and elliptically polarized light. Production and analysis of circularly and elliptically polarized light. Polaroids. Induced birefringence. Photo elasticity – isoclinic and isochromatic fringes – photo elastic bench

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 – III

Quantum Mechanics : Dual nature of matter. Wave function. Uncertainty principle. Energy and momentum operators. Eigen values and functions. Expectation values. Time Dependent and Time Independent Schrodinger equations. Particle in one dimensional box. Tunnelling (qualitative).

Statistical Mechanics :

Macrostates and Microstates. Phase space. Basic postulates of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics. Distribution equations in the three cases (no derivation). Bosons and Fermions. Density of states. Derivation of Planck's formula. Free electrons in a metal as a Fermi gas. Fermi energy.

Laser: Einstein's coefficients. Population inversion and stimulated emission. Optical resonant cavity. Ruby Laser, Helium-Neon Laser, Carbon dioxide Laser (qualitative). Semiconductor Laser (qualitative). Holography. Fiber Optics - Numerical Aperture and acceptance angle. Types of optical fibers. Applications.

REFERENCE:

1. Sears & Zemansky ; *University Physics*. *XI Edn.,; Pearson*
2. Frank & Leno; *Introduction to Optics*. *III Edn., , Pearson*
3. J.C. Upadhyaya*; Mechanics., Ram Prasad & Sons*
4. David J Griffiths*; Introduction to Electrodynamics, III Edn, , Pearson*
5. M Ali Omar*; Elementary Solid State Physics., Pearson*
6. S O Pillai*; Solid State Physics., New Age International Publishers*
7. John R Taylor, Chris D Zafiratos & Michael A Dubson*; Modern Physics for Scientists and Engineers*. *II Edn, Prentice Hall of India*
8. Eugene Hecht*; Optics*. *IV Edn, Pearson*
9. Robert Resnick ; *Introduction to Special Relativity., John Willey and Sons*
10. Richard L Libboff*; Introduction to Quantum Mechanics*. *IV Edn, Pearson*
11. Donald A Mcquarrie*; Statistical Mechanics., Vivo Books*
12. Mark Ratner& Daniel Ratner*; Nanotechnology*.
13. T.A. Hassan et al; A Text Book of Engineering Physics*., Aswathy Publishers, Trivandrum*
14. B. Premlet*; Advanced Engineering Physics , Phasor Books, Kollam.*

LIST OF DEMONSTRATION EXPERIMENTS

1. Newton's Rings – Determination of wave length.
2. Air Wedge – Diameter of a thin wire
3. Spectrometer – Plane transmission grating – wavelength of light.
4. Spectrometer – Refractive indices of calcite for the ordinary and extraordinary rays.
5. Laser – Diffraction at a narrow slit.
6. Laser – Diffraction at a straight wire or circular aperture.
7. Michelson's interferometer – Wavelength of light.
8. Michelson's interferometer – Thickness of thin transparent film.
9. Polarization by reflection – Brewster's law.
10. Computer stimulation – superposition of waves.
11. Computer stimulation – study of **E** & **H**. (Gauss' law & Ampere's law)

Pattern of Question Paper

*University examination is for a maximum of **100 marks**, in **3 hour** duration. The syllabus is spread in 3 modules. The question paper will consist of two parts (A and B).*

***Part A** contains short answer questions for **40 marks**. This part contains 10 questions without any choice, **each of 4 marks** (uniformly taken from all modules).*

***Part B** contains long answer questions for **60 marks**. From each module, this part contains 3 questions out of which 2 are to be answered, **each of 10 marks.** Long answer questions from all the 3 modules will form 60 marks.*

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08.103 ENGINEERING CHEMISTRY

L-T-T : 2-1-0 **Credits: 6**

MODULE-1

Electrochemistry - Electrodes- Electrode potential- Origin of electrode potential- Helmotz double layer- Nernst equation and application- Reference electrodes- Standared hydrogen electrode- Saturated calomel electrode- Quinhydron electrode-Determination of P^H using these electrodes- Concentration cells- Fuel cells- Secondary cells- Lead acid cell- Nickel cadmium cell- Lithium-ion cell. - Coductometric and Potentiometric titrations (acid base, oxidation reduction and precipitation titrations). **(12hrs)**

Corrosion and its control- Theories of corrosion (chemical corrosion and electrochemical corrosion)- Galvanic series- Types of corrosion (Concentration cell corrosion, Stress corrosion, Galvanic corrosion) - Factors affecting corrosion (nature of metal and nature of environment) and different methods of corrosion control (corrosion inhibitors, cathodic protection). **(5hrs)**

Protective coatings- Metallic coatings- Chemical conversion coatings- paint **(4hrs)**

Nano materials- Introduction-Classification-preparation (laser abrasion technique and sputtering technique)- Chemical method (reduction)-Properties and Applications of nano materials-Nano tubes-Nano wires. **(4hrs)**

MODULE-II

Water treatment- Types of hardness- Degree of hardness- Related problems- Estimation of hardness- by EDTA method- Sludge and scales in boilers- Priming and foaming- Boiler corrosion-Water softening methods, Lime-soda process, Ion exchange methods-Internal treatments (colloidal, carbonate, phosphate and calgon conditioning)- Domestic water treatment- Methods of disinfection of water-Desalination process (Reverse osmosis, electro dialysis- Distillation). **(12hrs)**

Envirnmental damages and prevention- Air pollution- CFCs and ozone depletion-Alternative refrigerents-Green house effect-Water pollution- BOD and COD- Waste water treatment- Aerobic - Anaerobic and USAB processes. **(3hrs)**

Thermal methods of analysis-Basic principles involved in Thermo gravimetry, Differential thermal analysis and applications. **(2hrs)**

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) **(6hrs)**

Chromatography- General principles- High performance liquid chromatography- Gas chromatography. **(2hrs)**

MODULE-III

Polymers- Classifications- Mechanism of polymarisation (Addition, free radical, cationic, anionic and coordination polymarisation)- Thermoplastics and thermosetting plastics-Compounding of plastics-Moulding techniques of plastics (Compression, Injection, Transfer and Extrusion moulding)-Preparation, properties and uses of PVC, PVA, PMMA, Nylon, PET, Bakelite, Urea formaldehyde resin- Silicon polymers- Biodegradable plastics. Elastomers- structure of natural rubber- vulcanisation- synthetic rubbers (Buna-S, Butyl rubber and Neoprene) **(12hrs)**

Organo electronic compounds -Super conducting and conducting organic materials like Polyaniline, polyacetylene and [polypyrrol and its applications. **(2hrs)**

Fuels- Calorific value- HCV and LCV-Experimental determination of calorific value-Theoretical calculation of calorific value by Dulongs formula - Bio fuels -Bio hydrogen and Bio-diesel **(5hrs)**

Lubricants- Introduction-Mechanism of lubrication- solid and liquid lubricant- Properties of lubricants-Viscosity index- flash and fire point- cloud and pour point- aniline value. **(4hrs)**

Cement- Manufacture of Portland cement- Theory of setting and hardening of cement **(2hrs)**

LAB-EXPERIMENTS (DEMONSTRATION ONLY)

1. Estimation of total hardness in water using EDTA.
2. Estimation of chloride ions in domestic water.
3. Estimation of dissolved oxygen.
4. Estimation of COD in sewage water.
5. Estimation of available chlorine in bleaching powder.
6. Estimation of copper in brass.
7. Estimation of iron in a sample of heamatite.
8. Determination of flash and fire point of a lubricating oil by Pensky Marten's apparatus.
9. Potentiometric titrations.
10. Preparation of buffers and standardisation of P^H meter.
11. Determination of molarity of HCl solution P^H-metrically.
12. Determinations of PH using glass electrode and quinhydron electrode.

REFERENCES

1. H.A. Willard, L.L. Merrit and J.A. Dean ; *Instrumental methods of analysis*
2. A.K. De ; *Environmental Chemistry*
3. K.J.Klauhunde; *Nanoscale materials in chemistry*
4. B.R. Gowariker ; *Polymer science*
5. B.W.Gonser ; *Modern materials*
6. V.Raghavan; *Material Science and engineering. A first course*
7. L.H. Van Vlack ; *Elements of Material science and Engineering*
8. J.W.Goodby ; *Chemistry of liquid crystals*
9. S.Glasstone ; *A text book of physical chemistry*
10. P.C. Jain; *Engineering Chemistry*
11. Juhaina Ahad ; *Engineering Chemistry*
12. Shashi Chawla ; *A text book of Engineering Chemistry*
13. R. Gopalan, D.Venkappayya & S. Nagarajan ; *Engineering Chemistry*
14. J.C. Kuriakose and J. Rajaram ; *Chemistry of Engineering and Technology volume I & II*
15. R.N Goyal and Harmendra Goeal; *Engineering Chemistry*, Ane Students Edition, Thiruvananthapuram

08.104 ENGINEERING GRAPHICS

L- T-D : 1-0-2 **CREDITS: 6**

Introduction to technical drawing and its language. Lines, lettering, dimensioning, scaling of figures, symbols and drawing instruments. (1 sheet practice)

MODULE I

Plain Curves: Conic sections by eccentricity method. Construction of ellipse: (i) Arc of circles method (ii) Rectangle method (ii) Concentric circles method. Construction of parabola (i) Rectangle method (ii) Tangent method. Construction of hyperbola (i) Arc of circles method (ii) given ordinate, abscissa and the transverse axis (iii) given the asymptotes and a point on the curve. Construction of Tangent and Normal at any point on these curves

Miscellaneous Curves: Construction of Cycloid, Epicycloid and Hypocycloid, Involute of a circle. Archimedian spiral, Logarithmic spiral and Helix. Construction of Tangent and Normal at any point on these curves

Projection of Points and lines: Types of projections, Principles of Orthographic projection. Projections of points and lines. Determination of true length, inclination with planes of projection and traces of lines.

MODULE II

Projection of Solids: Projection of simple solids such as prisms, pyramids, cone, cylinder, tetrahedron, octahedron, sphere and their auxiliary projections.

Selection of Solids: Types of cutting planes, section of simple solids cut by parallel, perpendicular and inclined cutting planes. Their projections and true shape of cut sections.

Development of Surfaces: Development of surfaces of (i) simple solids like prisms, pyramids, cylinder and cone (ii) Cut regular solids.

MODULE III

Isometric Projection : Isometric scale, Isometric view and projections of simple solids like prisms, pyramids, cylinder, cone sphere, frustum of solids and also their combinations.

Intersection of Surfaces : Intersection of surfaces of two solids as given below.
(i) Cylinder and cylinder (ii) Prism and prism. (iii) Cone and Cylinder. (Only cases where the axes are perpendicular to each other and intersecting with or without offset.)

Perspective Projection : Principles of perspective projection, definition of perspective terminology. Perspective projection of simple solids like prisms and pyramids in simple positions.

CAD: Introduction to CAD systems, Benefits of CAD, Various Soft wares for CAD, Demonstration of any one CAD software.

General Note:
(i) First angle projection to be followed (ii) Question paper shall contain 3 questions from each module, except from CAD. Students are required to answer any two questions from each module. (iii) Distribution of marks - Module -I 2 x 16 = 32, Module -II 2 x 17 = 34 Module III 2 x 17 = 34 Total (32+34+34 =100)

REFERENCES

1. Luzadder and Duff ; *Fundamentals of Engineering Drawing*
2. N. D. Bhatt ; *Engineering Drawing*
3. K. Venugopal *; Engineering Drawing and Graphics*
4. P.S. Gill; *Engineering Graphics*
5. P.I. Varghese; *Engineering Graphics*
6. K.R. Gopalakrishnan*; Engineering Drawing*
7. Thamaraselvi; *Engineering Drawing*
8. K.C. John; *Engineering Graphics*
9. K.N. Anil Kumar; *Engineering Graphics*

08.105 ENGINEERING MECHANICS

L-T-P: 2 - 1 – 0 **Credits: 6**

MODULE I (20 HRS)

Idealizations of Mechanics- Elements of vector algebra

Statics of rigid bodies-Classification of force systems- principle of transmissibility of a force- composition and resolution- Resultant and Equilibrant of coplanar concurrent force systems-various analytical methods- - Lami's theorem, method of resolution- Conditions of equilibrium- Moment of a force, couple, properties of couple- Varignon's theorem- Resultant and equilibrant of coplanar non-concurrent force systems- Conditions of equilibrium. Equilibrium of rigid bodies-free body diagrams.(simple problems) Types of supports - types of beams - types of loading- Support reactions of simply supported and overhanging beams under different types of loading. Forces in space, equations of equilibrium, Vector approach. Friction-Laws of friction-angle of friction- cone of friction- ladder friction- wedge friction.

MODULE II (20 HRS)

Properties of surfaces- centroid of composite areas- Theorems of Pappus-Gouldinus-Moment of inertia of areas, Parallel and perpendicular axes theorems- Radius of Gyration-moment of inertia of composite areas. **Dynamics: Kinematics**-Combined motion of translation and rotation-instantaneous centre, motion of link, motion of connecting rod and piston, wheel rolling without slipping. Relative velocity - basic concepts-analysis of different types of problems **Kinetics**-Newton's laws of translatory motion- D'Alembert's principle- Motion of lift- Motion of connected bodies.

MODULE III (20 HRS)

Work, Power and Energy - Work-Energy principle-Impulse, Momentum. Collision of elastic bodies-Law of conservation of momentum-Direct and oblique impact between elastic bodies and impact with fixed plane. Curvilinear motion- D'Alembert's principle in curvilinear motion- Mass moment of inertia of rings, solid discs and solid spheres (no derivations required)Angular momentum-Angular impulse. Kinetics of rigid bodies under combined translatory and rotational motion – work – energy principle for rigid bodies. Centrifugal and centripetal forces – motion of vehicles on curved paths in horizontal and vertical planes – super elevation – stability of vehicles moving in curved paths (qualitative ideas only). Simple harmonic motion – vibration of mechanical systems - basic elements of a vibrating system – spring mass model – undamped free vibrations – angular free vibration – simple pendulum.

REFERENCES:

1. Beer & Johnston, "*Vector Mechanics for Engineers – Statics and Dynamics"*, Tata Mc-Graw Hill Publishing Company Limited, New Delhi, 2005.
2. Irving. H. Shames, "*Engineering Mechanics*", Prentice Hall Book Company, 1966.
3. Timoshenko S. & Young D. H., "*Engineering Mechanics*", Mc-Graw Hill –International Edition
4. Popov, "*Mechanics of Solids*", Pearson Education,2007
5. Kumar K.L., "*Engineering Mechanics*", Tata Mc-Graw Hill Publishing Company Limited, New Delhi, 1998.
6. Rajasekaran S. & Sankarasubramanian G., "*Engineering Mechanics*", Vikas Publishing House Private Limited, New Delhi, 2003.
7. Tayal A K, "*Engineering Mechanics- Statics and Dynamics*" , Umesh Publications, Delhi,2004
8. Benjamin J., "*Engineering Mechanics",* Pentex Book Publishers and Distributors, Kollam, 2008

Note: *Question For University Examination:- Part A – 8 compulsory questions covering entire syllabus, 5 marks each. (5 x 8 = 40) Part B – Three questions of 10 marks from each module, out of which two should be answered (10 x 2 x 3 = 60).*

08.106 BASIC CIVIL ENGINEERING

L-T-P: 2- 1 - 0 **Credits: 6**

MODULE I

Surveying*:* Object and Principles of Surveying.
Linear Measurements: Direct measurements - Tape & chain only - Ranging out survey lines- Taking measurements of sloping ground - Errors - Tape correction (problems).
Levelling: Levelling instruments - Level (Dumpy Level, Tilting Level) Levelling Staff. Measurements in levelling - Temporary adjustments of a level, holding the staff, reading the staff - Principles of leveling - recording measurements in the field book - reduction of level - height of collimation method only (simple examples).
Contour maps (Brief description only). Computation of areas - Mid ordinate rule, average ordinate rule, Trapezoidal rule, Simpson's rule (examples)- Introduction to Distomat, Total Station & GPS (Brief description only)

MODULE II

Building construction*:* Selection of site for buildings - types of buildings - Components of buildings.
Foundation: Different types - Spread footing, Isolated footing, Combined footing, Mat foundation¸ Pile foundation (description only).
Safe Bearing Capacity of Soil: Importance of determination of the Safe Bearing Capacity of Soil (brief description only).
Super structure: Masonry - stone masonry, brick masonry –Types- desirable qualities of stone and brick.
Partition: Materials used for making partition - plywood, particle boards & glass.
Doors, windows & ventilators : Types - materials used for the construction of doors and windows - wood, steel & Aluminium.
Plastering: Mortar – properties - Preparation of Cement mortar
Painting: Preparation of surfaces for painting - plastered, wood and steel surfaces- Types of paint - enamel, emulsion & distemper. Flooring: Types - mosaic tiles, ceramic tiles, marble, granite and synthetic materials. Roofing: Selection of type of roof -flat roof, sloping roof - Concrete roof, tiled roof. Selection of roof covering materials. GI Sheet , AC Sheet, PVC Sheet

MODULE III

Concrete: Ingredients- cement, aggregate, and water. Qualities of ingredients (brief description only).
Tests on Cement - consistency, initial and final setting times. Compressive strength -IS Specifications.
Aggregates – desirable qualities of fine and coarse aggregates
Plain Cement Concrete (PCC): preparation-proportioning-mixing of concrete.
Steel-common types used in construction- Mild Steel, HYSD Steel and their properties.
Reinforced Cement Concrete (RCC)-advantages of RCC over Plain Cement Concrete.
Elementary ideas on pre-cast and pre-stressed concrete constructions.
Building services – vertical transportation – stairs – types, escalators and elevators, ramps (brief description only). Plumbing services- brief description of water supply and sewage disposal arrangements for residential buildings.

REFERENCE:

1. Adler R., *Vertical Transportation for Buildings*, American Elsevier Publishing Company, New York.1970
2. B.C Punmia, "*Surveying & Leveling" Vol*. – I, Laxmi publications(P) Ltd,N.Delhi, 2004
3. Rangwala., *Building Materials,*Charotar publishing house, 2001
4. Rangwala, "*Building Construction*" , Charotar Publishing House., 2004
5. S.K. Roy, "*Fundamentals of Surveying*" Prentice-Hall of India, New Delhi.2004
6. Rangwala.,"*Water Supply and Sanitary Engineering*", Charotar Publishing House. 1990
7. Moorthy, "*Building Construction*", Modern Publishing House distributor., 1957
8. Jha and Sinha, "*Construction and Technology*"
9. Narayanan and Lalu Mangal ,"*Introduction to Civil Engineering*"Phasor Books,Kollam.
10. Santha Minu, "*Basic Civil Engineering*" Karunya Publications,Trivandrum

Note: *The question paper will consists of two parts. Part I and part II..*

Part I is Compulsory covering the entire syllabus, for 40 marks. It contains 8 questions of 5 marks each.
Part II is to cover 3 modules. There will be two questions (20 marks each) from each module out of which one from each module is to be answered. (20 X 3 = 60)

08.107 BASIC MECHANICAL ENGINEERING

L-T-P/D : 3-1-0 **Credits: 6**

MODULE I

Thermodynamics : Basic concepts and definitions of Zeroth law, First law, Second law of thermodynamics- concept of reversibility and entropy. p-v and T-s diagrams
Air cycles: Carnot, Otto and Diesel cycles-Air standard efficiency (simple problems)
IC Engines: Working and comparison of two stroke and four stroke petrol and diesel engines - general description of various systems using block diagrams – air system, fuel system, ignition system and governing system. A brief description of CRDI, MPFI, GDI and Hybrid Vehicles
Steam boilers: Classification – Cochran boiler, Babcock and Wilcox boiler, Benson boiler-fluidized bed combustion,

MODULE II

Principles and fields of application of - compressors - reciprocating and centrifugal, blower, pumps- reciprocating, centrifugal and jet pumps, steam and hydraulic turbines- impulse and reaction, gas turbine cycles- open and closed
Elementary ideas of hydro electric, thermal and nuclear power plants
Refrigeration & Air Conditioning: Refrigerants, CFC free refrigerants. Vapor compression refrigeration system, Comfort and Industrial air conditioning-typical window air conditioning unit (general description only).

MODULE III

Mechanical Power transmission systems: Belt, rope and gear drives-types, comparison and fields of application-velocity ratio-slip (simple problems) friction disc, single plate clutch, gear trains (no derivations).
Manufacturing processes: Elementary ideas of casting, forging, rolling, welding, soldering and brazing
Machining processes- turning, taper turning, thread cutting, shaping, drilling, grinding, milling (simple sketches and short notes).
Non conventional machining - Electro discharge machining (EDM) and Electro chemical machining (ECM)
Principle, application and advantages of C N C machine

REFERENCES

1. Spalding and Cole, "*Engineering Thermodynamics*"
2. Gill, Smith and Zuirys, "*Fundamentals of IC Engines*"
3. Amstead, Ostwald and Begeman, "*Manufacturing processes*"
4. Crouse, "*Automobile Engineering*"
5. Roy and Choudhary, "*Elements of Mechanical Engineering*"
6. Hajra Choudhary, "*Workshop Technology*"
7. R K Bensal, "*Fluid mechanics and machines*"
8. J Benjamin, "*Basic Mechanical Engineering*"

Note: Lectures are to be supplemented by demonstration in laboratories.
The question paper will consist of two parts.
Part I is to be compulsory for 40 marks. This may contain 10 questions of 4 marks each.
Part II is to cover 3 modules. There can be 3 questions from each module (10 marks each) out of which 2 are to be answered.

08.108 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L-T-P : 2–1-0 **Credits 6**

MODULE – I

Elementary concepts - Kirchoffs laws - Magnetic Circuits - MMF, field strength, flux density, reluctance – problems in series magnetic circuits. Review of electromagnetic induction - Faradays laws, Lenz's law - statically induced and dynamically induced emf - self and mutual induction - inductance.

Alternating current fundamentals - generation of alternating currents – waveforms - frequency - period - average and rms values - form factor. Phasor representation of alternating quantities - rectangular polar and exponential forms.

Analysis of simple ac circuits – concept of impedance and admittance - phasor representation - *j* notation - power and power factor in ac circuits - active and reactive components. Solution of RL, RC and RLC series circuits.

Three phase systems - generation of three phase voltage - star and delta connection - relation between phase and line values of voltage and current - phasor representation - three wire and four wire systems.

Measurement of power in three phase circuits (two wattmeter method). Measurement of energy – working of 1-phase energy meter.

MODULE – II

Transformers - Principle of operation - EMF equation - constructional details of single phase and three phase transformers

Methods of bulk generation of electric power. Block schematic of layout of generating stations - hydroelectric, thermal and nuclear power plants. Renewable energy sources - solar, wind, tidal, wave and geothermal energy.

Bulk transmission of electric power - typical electrical power transmission scheme - need for high transmission voltage - substations - substation equipments. Primary and secondary transmission and distribution systems

Different methods of wiring for LT installations. Schematic layout of LT switchboards. Earthing of installations - necessity of earthing - plate and pipe earthing. Protective fuses, MCBs, ELCBs and switches.

Working of incandescent lamps, -fluorescent lamps, energy efficient lamps

MODULE – III

Diodes - PN junction diodes,. V-I characteristics, dynamic & static resistance, principle of working and V-I characteristics of Zener diode, principle of Photo diode, Solar cell, & LED.

Rectifiers & power supplies - block diagram description of a dc power supply, circuit diagram & working of half-wave & full wave rectifier, final equations of Vrms, Vdc, ripple factor and peak inverse voltage in each case, principle of working of series inductor and shunt capacitor filters. Working of simple zener voltage regulator.

Power devices – V – I characteristics and applications of SCR and Triac Working principle of UPS and SMPS

Transducers – Resistance strain guage, thermistor, LVDT

REFERENCES

1. V.N. Mitlle, "*Basic Electrical Engineering*", Tata McGraw Hill, 1990.
2. DP Kothari, LJ Nagrath, "*Theory and Problems of Basic Electrical Engineering*", Prentice Hall of India, 2000.
3. B.L. Thereja, "*A Text Book of Electrical Technology*", Volume I, S Chand & Co, New Delhi, 1992.
4. Francis M Fernandez, "*A Basic Course in Electrical Engineering*", Rajath Publishers, Ernakulam.
5. TP Imthias Ahmed, B. Premlet, "*Introduction to Electrical Engineering*", Phaser Books, Kollam
6. Gopakumar, "*Introduction To Electronics and Communications*", .Phasor Books, Kollam
7. Millman and Halkias, "*Integrated Electronics: Analog and digital circuits and systems*", McGraw-Hill Book Co
8. Edward Hughes, "*Electrical and Electronic Technology*", Pearson Education, 2002.
9. ML Soni, PU Guptha, US Bhatnagar and A Chakrabarthy, "*A Text Book on Power System Engineering*", Dhanpath Rai & Sons, New Delhi 1997
10. N.N.Bhargava, "*Basic Electronics and Linear Circuits*", Tata McGraw Hill
11. Rangan C.S., Sarma G.R., and Mani V.S.V., "*Instrumentation Devices and Systems*", Tata McGraw Hill, 1992.
12. Muhammad H. Rashid, "*Power Electronic Circuits, Devices and Applications*", Pearson education, Asia 2003.

Note : *The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice- One out of two or two out of four from each module).*

08.109 BASIC COMMUNICATION AND INFORMATION ENGINEERING

L – T – P: 2-1-0 **Credits: 6**

MODULE I (Qualitative Treatment)

(a) Bipolar junction transistors: NPN & PNP transistors, structure, typical doping, working of NPN transistor, concepts of common base, common emitter & common collector configurations, current gain of each, input & output characteristics of common emitter configuration, comparison of three configurations with reference to voltage & current gain, input & output resistances and applications. (6 hrs)
(b) Field effect Transistors : basic principles of JFET, MESFET and MOSFET, comparison with BJT. (3 hrs)
(c) Amplifiers & Oscillators: circuit diagram & working of common emitter amplifier, function of each component in the circuit, need of proper biasing, frequency response, voltage gain and 3dB bandwidth, concepts of class A, B, AB and Class C power amplifiers, circuit diagram & working of push pull amplifiers, concepts of feedback, working principles of oscillators, circuit diagram & working of RC phase shift oscillator (7 hrs)
(d) Integrated circuits: advantages of ICs, analog and digital ICs, functional block diagram of operational amplifier, ideal operational amplifier,use as inverting amplifier, non inverting amplifier, summing amplifier, integrator and comparator. (4 hrs)
(e) Digital ICs:logic gates, realization of logic functions, principle of combinational and sequential logic circuits, flip flop (JK), logic families: TTL and CMOS Logic (No internal diagram) (4 hrs)
(f) IC fabrication: purification of silicon, crystal growth, wafer preparation. unit process: oxidation, diffusion, ion implantation, epitaxy, deposition, photolithography. (4 hrs)

MODULE II(Qualitative Treatment)

(a) Measurements: principle and block diagram of analog and digital multimeter, working principle of CRT, block diagram of CRO, measurements using CRO, principle of digital storage oscilloscope, principle and block diagram of function generator. (5hrs)
(b) Radio communication: principle of AM & FM, wave forms, bandwidths, block diagrams of AM & FM transmitters, principle of AM &FM demodulation, comparison of AM & FM,principle &block diagram of super heterodyne receiver. (4 hrs)
(c) Color television: TV Standards,interlaced scanning, block diagram of PAL TV transmitter & receiver, basic principles of cableTV, CCTV system, basic principles of HDTV, basic principles of LCD & Plasma displays. (5 hrs)
(d) Radar and navigation: principle of radar and radar equation, block schematics of pulsed radar, factors affecting range, applications of radar in measurements and navigation. (4 hrs)
(e) Satellite communication: microwave frequency bands, concept of geo-stationary satellite, frequency bands used, satellite transponder, block diagram of earth station transmitter & receiver, advantages of satellite communication, principle of Global Positioning System (GPS). (3 hrs)
(f) Optical communication: block diagram of the optical communication system, principle of light transmission through fiber, concepts of Single Mode and Multi Mode optical fiber, working principle of source (semiconductor Laser) & detector (PIN,APD), advantages of optical communication. (5 hrs)

MODULE III (Qualitative Treatment)

(a) Computer Architecture: functional units: basic concept of ALU- data path and control, memory hierarchy, caches, main memory, virtual memory, operating systems, microprocessors - functional block diagram of 8085 (9 hrs)
(b) Data communication: overview, analog and digital data transmission, transmission media, digitization of wave forms, PCM , digital modulation techniques- ASK, PSK, FSK, basic concepts of error detection , parity checking. (6hrs)
(c) Mobile communication: basic principles of cellular communications, concepts of cells, frequency reuse, principle and block diagram of GSM,principle of CDMA, WLL & GPRS technologies. (4hrs)
(d) Internet Technology: concepts of networking: client - server computing, IP addresses, domain names, network interface unit - modem, switching technologies- circuit switching and packet switching, LAN,MAN,WAN &World wide web, network topologies, communication protocols- TCP/IP, Introduction to web languages-HTML ,XML, internetworking concepts, network devices- basic principles of router, bridge, switch, network security- Firewall. (7 hrs)

REFERENCES

1. Santiram Kal, *Basic Electronics – Devices, Circuits and IT fundamentals*, PHI
2. Louis.E.Frenzel, *Principles of Electronic Communication Systems*, TMH
3. William Stallings, *Wireless Communications and Networks*, Pearson Education.
4. M.Moris Mano, *Computer Architecture*, PHI
5. Neil H E Weste,Kamran Eshraghian, *Principles of CMOS VLSI design – A system perspective*, Pearson Education [Module 1(f)]
6. David A. Bell, *Electronic Instrumentation and Measurements*, PHI .[Module 2(a)]
7. N N Bhargava,D C Kulshreshtha,S C Gupta, *Basic Electronics & Linear Circuits*, TMH
8. ITL Education Solution Ltd., *Introduction to Information Technology*, Pearson Education, 5th edition, 2008
9. R.R. Gulati, *Monochrome and Colour Television*, New Age International [Module 2 (c)]
10. K Gopakumar, *Introduction to Electronics & Communication* , 3rd edition, 2008,Phasor Publisher's,Kollam

This subject shall be handled by faculty of Dept. of Electronics and Communication in the Colleges.

Question Paper

The question paper shall consist of two parts. Part I is to cover the entire syllabus, and carries 40 marks. This shall contain 10 compulsory questions of 4 marks each. Part II is to cover 3 modules, and carries 60 marks. There shall be 3 questions from each module (10 marks each) out of which 2 are to be answered.

08.110 ENGINEERING WORKSHOPS

L - T-P: 0-0-2 **CREDITS: 4**

A. Carpentry:

Study of tools and joints. Practice in planning, chiseling, marking and sawing. Joints – Cross joint, T joint, Dove tail joint.

B. Fitting:

Study of tools, Practice in filing, cutting, drilling and tapping. Male and female joints, Stepped joints.

C: Sheet Metal Work:

Study of tools. Selection of different gauge GI sheets for jobs. Practice on riveted joints. Preparing tube joints, frustums, trays and containers.

D. Plumbing:

Study of tools. Details of plumbing work in domestic and industrial applications. Study of pipe joints, cutting, threading and laying of pipes with different fittings using PVC pipes. Use of special tools in plumbing work.

E: Foundry:

Study of tools. Preparation of sand, moulding practice and demonstration of casting.

F. Welding:

Study of welding machines. Straight line practices, Making of Butt joint, T joint and Lap joint.

G: Smithy:

Study of tools. Demonstration on forging of square prism, hexagonal bolt, T bolt and Eye bolt.

H: Machine Tools:

Study and demonstration on working of machine tools. Lathe and Drilling machine.

NOTE: *For the university examination the student shall be examined in sections A, B, C, D and E only.*

Information Technology

Third Semester - Eighth Semester

University Examination Pattern
(for all theory subjects, unless otherwise specified)

PART A	***Short answer questions*** **All questions are compulsory. There should be at least three questions from each module.**	***10 x 4 marks=40 marks***
PART B	***Descriptive/Analytical/Problem solving questions*** **Candidates have to answer one question out of two or two questions out of four from each module.**	***3 x 20 marks=60 marks***
		Total Marks: 100

SEMESTER III

08.301 ENGINEERING MATHEMATICS II
(C M P U N E R F T A H B)

L-T-P : 3-1-0 **Credits: 4**

MODULE I (16 hours)

Multiple Integrals: Double Integrals (Cartesian only). Change of order of integration. Area enclosed by plane curves. Triple integrals. Volume of solids.
Vector Integration: Line and surface and volume integrals. Green's theorem in the plane. Stoke's theorem and Gauss' divergence theorem (no proof).

MODULE II (18 hours)

Fourier Series: Fourier series of periodic functions of period 2π and $2l$. Dirichlet's condition for convergence. Odd and even functions. Half range expansions.
Fourier Transforms: Fourier integral theorem (no proof) – Fourier transforms – Fourier sine and cosine transforms, inverse Fourier transforms, properties.

MODULE III (18 hours)

Partial differential equations: Formation of PDE. Solution of Lagranges linear equation. First order nonlinear equations – standard forms – Homogeneous PDE with constant coefficients.
Application of PDE: Derivation of one-dimensional Wave and Heat equations. Solution by separation of variables. Boundary value problems in one-dimensional Wave and Heat equations.

Reference Books

1. Advanced Engineering Mathematics, 8th Edn. – Kreyszig, Wiley Eastern.
2. Advanced Engineering Mathematics – Peter O Neil, Thomson Publications.
3. Higher Engineering Mathematics – B. S. Grewal, Khanna Publishers.
4. Higher Engineering Mathematics – B. V. Ramana, Tata Mc Graw Hill.
5. Advanced Engineering Mathematics – Michael D. Greenberg, Pearson Education

08.302 PROBLEM SOLVING AND PROGRAMMING IN C

L-T-P : 2-2-0 **Credits: 4**

MODULE I (15 hours)

Introduction to digital computer – Von Neumann concept – hypothetical decimal computer – functional units of a computer – storage – primary storage – secondary storage. Introduction to programming languages – types of programming languages – high level languages – assembly language – machine language. Problem solving concepts – flow charts and algorithms – problem definition phase – general problem solving strategies – top-down design – breaking a problem into sub problems – choice of a suitable data structure. Documentation of programs – debugging of programs.

MODULE II (20 hours)

Important C concepts. Preprocessor directives – header files – data types and qualifiers – operators and expressions – enumerations – data input and output – control statements – arrays and strings – structures and unions – working with bits in C – storage classes. Example programs including bubble sort, selection sort, and linear and binary search.

MODULE III (17 hours)

Pointers – arrays of pointers – structures and pointers. Memory allocation functions. Function – function definition – function prototypes – function call by value and call by reference – recursive functions. Data files – formatted, unformatted and text files. Low level programming in C. Command line arguments. Example programs.

Text Books:

1. Computer Programming in C – V. Rajaraman, PHI
2. Programming with C – B.S. Gottfried, Schaum's Series, TMH.
3. A structured Programming Approach Using C – B.A. Forouzan and R.F. Gilberg, Thomson Learning.
4. Problem Solving and Program Design in C – J.R. Hanly and E.B. Koffman, Pearson/Addison Wesley
5. Fundamentals of computers – V. Rajaraman, PHI

Reference Books:

1. The C Programming language – Keringhan B.W. and Ritche D.M., PHI 1990.
2. Programming with ANSI and Turbo C – Ashok N. Kamthane, Pearson Education India
3. Programming Techniques through C – M.G. Venkateshmurthy, Pearson Education India.
4. A Book on C – A. Kelly and I. Pohl, Pearson Education.

08.303 DISCRETE STRUCTURES (R F)

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (11 hours)

Statement calculus: Statements, connectives, statement formulas, truth tables, conditional, biconditional, well formed formulas, tautology, contradiction, equivalence of formulas, duality law, tautological implications, formulas with distinct truth tables, functionally complete set of connectives, two state devices and statement logic, Theory of inference for statement calculus, validity using truth tables, rules of inference, consistency of premises and indirect method of proof. *Predicate calculus:* predicates, statement functions, variables and quantifiers, predicate formulas, free and bound variables, universe of discourse, theory of inference for predicate calculus.

MODULE II (14 hours)

Set Theory: basic concepts of set theory. *Representation of discrete structures:* data structures, storage structures, sequential allocation, pointers and linked allocation. *Relations and ordering :* relations – properties of binary relations in a set, relation matrix and graph of a relation, Partition and covering of a set, equivalence relations, compatibility relations, composition of binary relations, Partial ordering, Partially ordered set -representation. *Functions :* one to one, onto, bijection, composition of functions, inverse functions, binary and n-ary operations, natural numbers – Peano Axioms and Mathematical induction, Pigeon hole principle. Cardinality – countable and uncountable sets, Cantor's theorem of power sets. Recursion – recursion in programming languages.

MODULE III (14 hours)

Algebraic structures : simple algebraic systems and general properties, morphism, congruence relation, subalgebra, product algebra and factor algebra, semigroups & monoids - morphism, cyclic semi groups and monoids, subsemigroups and submonoids, groups – abelian groups, permutation groups, cyclic groups, subgroups and homomorphism, cosets and Lagrange's theorem, normal subgroups. Algebraic systems with two binary operations – ring, integral domain, field, error detection and correction using group codes. Lattices as partially ordered sets, properties of lattices, lattices as algebraic systems, sub lattices, direct product and homomorphism, Boolean algebra, subalgebra, direct product and homomorphism, Boolean functions. Basic concepts of graph theory - basic definitions of graphs, paths, reachability and connectedness (No theorems and proofs).

Text Books:

1. Discrete mathematical structures with applications to computer science – J.P. Tremblay and R. Manohar, TMI
2. Discrete mathematical structures for computer science – Kolman B., Prentice Hall, 1988.
3. Discrete mathematics with applications – Koshy, Elsevier.
4. Discrete mathematical structures – J. Ganguly, Sanguine Technical Publishers

Reference Books:

1. Elements of discrete mathematics - C.L. Liu, TMH
2. Modern algebra – Herstein.
3. Algorithmic graph theory – Gibbons, Cambridge University Press.
4. Discrete mathematics and its applications with combinatorics and graph theory – K.H Rosen, McGraw-Hill
5. Discrete and combinatorial mathematics-an applied introduction – R.P. Grimaldi and B.V. Ramana, Pearson Education.

08.304 ELECTRONIC CIRCUITS (R F)

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (12 hours)

Design and analysis of Rectifiers, Filters, Clippers, Clampers, Regulators, Differentiators, Integrators- RC circuits-response of high pass / low pass RC to sine wave, pulse and square wave inputs- principle of operation of inverters, uninterrupted power supplies, switched mode power supplies

MODULE II (13 hours)

Transistor amplifiers- classification – small signal analysis – voltage divider bias – emitter follower configuration- feed back configurations- RC phase shift, wein bridge, Colpitts, Hartely oscillator(No derivations), Multivibrators- monostable, bistable and astable- 555 timer and applications (No derivations)

MODULE III (14 hours)

Operational Amplifiers, Block diagram, characteristic features of OP Amps, ideal OP Amps, common mode and difference mode- summing amplifier, differential amplifier, inverting, non inverting amplifiers. Active filters, Applications, Chebyshev and Butterworth filters, Low pass Butterworth Filter, High pass Butterworth Filter, Band Pass and Band rejection filters, Oscillators- Wein Bridge and Phase shift Oscillators

Text Books:

1. Electronic Devices and Circuits Theory – Boylestead and Nashelky, PHI
2. Op-amp and Linear Integrated Circuits – Gayakwad, 4th Edn., Pearson Education

Reference Books:

1. Electronic Circuits – R.D. Sudhaker Samuel and V Nattarsu, Sanguine Technical Publishers

08.305 DIGITAL SYSTEM DESIGN (R F)

L-T-P:2 – 2 – 0 **Credits: 4**

MODULE I (16 hours)

Number systems – Decimal, Binary, Octal and Hexadecimal – conversion from one system to another – representation of negative numbers – representation of BCD numbers – character representation – character coding schemes – ASCII – EBCDIC etc. Addition, subtraction, multiplication and division of binary numbers (no algorithms). Addition and subtraction of BCD, Octal and Hexadecimal numbers. Representation of floating point numbers – precision – addition, subtraction, multiplication and division of floating point numbers (no algorithms).

MODULE II (18 hours)

Postulates of Boolean algebra – logic functions – logic gates – methods of minimization of logic functions – Karnaugh map method and tabulation method – realization using logic gates. Design of combinational logic circuits – adder, subtractor, parallel adder, carry look ahead adder, multilevel carry look ahead adder, BCD adder, code converter, magnitude comparator, decoder, multiplexer, demultiplexer, parity generator – design examples.

MODULE III (18 hours)

Sequential logic circuits – flip flops – RS, JK, D and T type – master slave flip flop. Analysis and design of clocked sequential circuits – state diagram – state reduction and assignment – design with state equations – shift registers – universal shift registers – serial adder – design of synchronous and asynchronous counters – timing Sequences. Introduction to Programmable Logic Devices (PLDs). Basics of Hardware Description language (HDL).

Text Books:

1. Digital Design – M. Morris Mano, Pearson Education.
2. Digital Fundamentals – T.L. Floyd and R.P. Jain, Pearson Education.
3. Digital Electronics Principles and Applications – Tokheim, TMH.

Reference Books:

1. Digital Electronics-an Introduction to Theory and Practice – W.H. Gothman, PHI.
2. An Introduction to Digital Computer Design – V. Rajaraman and T. Radhakrishnan, 5th Edn., PHI.
3. Digital Logic Applications and Design – J.M. Yarbrough, Thomson Learning.
4. Digital Design and Computer Architecture – D.M. Harris and S.L. Harris, Morgan Kaufmann Publishers.

08.306 COMPUTER ORGANIZATION (R F)

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (10 hours)

Basic Structure of computers – functional units – basic operational concepts – bus structures – software. Memory locations and addresses – memory operations – instructions and instruction sequencing – addressing modes – assembly language – PDP-11 addressing modes and instructions – basic I/O operations – stacks and queues – subroutines.

MODULE II (14 hours)

Basic processing unit – fundamental concepts – execution of a complete instruction – multiple-bus organization – sequencing of control signals. I/O organization – accessing of I/O devices – interrupts – direct memory access – buses – interface circuits – standard I/O interfaces (PCI, SCSI, USB).

MODULE III (15 hours)

Memory system – basic concepts – semiconductor RAMs – memory system considerations – semiconductor ROMs – flash memory – cache memory – interleaving – basic concepts of virtual memory, segmentation and paging – associative memory. Computer peripherals – input devices – output devices. RAID.

Text Books:

1. Computer Organization – C. Hamacher, Z. Vranesic and S. Zaky, Mc Graw Hill Publishing Company.
2. Computer Organization and Design – D.A. Patterson and J.L Hennessey, Morgan Kauffmann Publishers.

Reference Books:

1. Computer Organization and Design – P. Chaudhuri, Prentice Hall of India Pvt. Ltd.
2. Computer Organization Programming – C.W. Gear, Mc Graw Hill International Student Edition.
3. Introduction to Computer Systems using PDP – 11 and Pascal – Glenn H. Mac Even, Mc Graw Hill.
4. Computer Organization – C. Hamacher, Z. Vranesic and S. Zaky, 2nd Edn. (for PDP-11addressing modes and instructions), Mc Graw Hill Publishing Company.
5. The indispensable PC Hardware Book – H.P. Messmer
6. Upgrading and Repairing PCs – Scottmuller, Pearson Education.

08.307 ELECTRONIC CIRCUITS LAB (R F)

L-T-P: 0 – 0 – 4 **Credits: 4**

1. Characteristics of diode, zener diode.
2. CE characteristics of BJT.
3. CS characteristics of FET.
4. Rectifier circuits with and without filters.
5. RC lowpass and highpass circuits.
6. Differentiating and Integrating circuits.
7. Clipping and Clamping circuits.
8. Simple zener diode regulator.
9. RC coupled amplifier using BJT.
10. RC phase shift oscillator using BJT.
11. Astable and Monostable multivibrators using 555 Timer IC.
12. Astable and Monostable multivibraors using 741 OPAMP.

03.308 PROGRAMMING LAB (R F)

L-T-P: 0 – 0 – 4 **Credits: 4**

Familiarization of operating systems like DOS and Windows. Programming exercises in C based on the course ***08.302 Problem Solving and Programming in C.***

The programming exercises include:

Decision making, branching and looping
- if, if … else statements
- switch, goto statements
- while, do, for statements

Arrays and strings
- one-dimensional, two-dimensional, multidimensional arrays
- reading/writing strings
- operations on strings
- string handling

Functions
- user defined functions
- function calls, arguments & return values
- nesting of functions
- recursive functions
- passing arrays and strings to functions

Structures and unions
- copying and comparing structure variables
- arrays of structures
- arrays within structures
- structures with in structures
- structures and functions
- unions

Pointers
- pointers and arrays
- pointers and character strings
- array of pointers
- pointers and functions
- pointers and structures

Files, memory allocation, bit-level programming
- files → defining, opening/closing, input-output operations
- command line arguments
- memory allocation functions
- bit-wise operators

SEMESTER IV

08.401 ENGINEERING MATHEMATICS III
(C M P U N E R F H B)

L-T-P: 3 – 1 – 0 **Credits: 4**

MODULE I (17 hours)

Complex Differentiation: Limits, continuity and differentiation of complex functions. Analytic functions – Cauchy Reimann equations in Cartesian form (proof of necessary part only). Properties of analytic functions – harmonic functions. Milne Thomson method.

Conformal mapping: the transformations $w = 1/z$, $w = z^2$, $w = z + 1/z$, , Bilinear transformation.

MODULE II (17 hours)

Complex Integration: Line integral – Cauchy's integral theorem – Cauchy's integral formula. Power series – radius of convergence – Taylors and Laurents series – zeros and singularities – residues and residue theorem. Evaluation of real definite integrals – with no poles of $f(z)$ on the real axis (proof of theorems not required).

MODULE III (18 hours)

Numerical Techniques: Errors in numerical computation – solution of algebraic and transcendental equations by bisection method, Regula false method, Newton-Raphson method. Solution of linear systems by Gauss elimination and Gauss-Seidal method. Newtons forward and backward interpolation formula. Lagranges interpolation formula. Numerical integration. Trapezoidal and Simpson's rule. Numerical solution of ODE Taylor series method, Euler's method, Runge Kutta methods (derivation of formulae not required for the above methods).

Reference Books

1. Advanced Engineering Mathematics – Peter O Neil, Thomson Publications.
2. Advanced Engineering Mathematics, 8th Edn. – Kreyszig, Wiley Eastern.
3. Advanced Engineering Mathematics – Michael D. Greenberg, Pearson Education
4. Higher Engineering Mathematics – B. S. Grewal, Khanna Publishers.
5. Higher Engineering Mathematics – B. V. Ramana, Tata Mc Graw Hill.
6. Numerical Methods with Programming – C.T. Veerarajan and T. Ramachandran
7. Introductory Methods of Numerical Analysis – S.S. Sastry

08.402 HUMANITIES
(C R F T A H B)

L-T-P: 3 – 0 – 0 **Credits:3**

Part I – Economics (2 Periods per week)

MODULE I(13 hours)

Definition of Economics – Basic Concepts Goods – Choice of techniques – Production possibility curve National Income concepts - GNP – GDP – NNP – Per Capita Income – Three Sectors of the Economy – Primary – Secondary, Tertiary Sector – Significance of Money.
Meaning of Demand and Supply – Types of demand – Determinants of Demand – Demand forecasting
Production function – Law of Variable proportion – Returns to scale - Least cost combination of inputs – Cost concepts – Cost output relationship.

MODULE II(13 hours)

Inflation – causes of inflation – measures to control inflation – Demand – Pull inflation – cost push inflation – effects of Inflation – effects of inflations comparison between inflation and deflation.
India's Economic crisis in 1991 – New economic policy – Global Financial meltdown in 2008 – Applicability of Keynesian Theory to UDC'S.
Stock Market and present scenario – Industrial sector past and present – Industry Analysis – Electronics – Chemical – Automobile – FMCG Industry.
Environment and Development – Basic Issues – Sustainable Development and Environmental Accounting – Population – Resources and the Environment – Poverty and the Environment – Growth versus the Environment – The Global Environment.

Part II – Accountancy (1 Period per week)

MODULE III(13 hours)

Book- Keeping and Accountancy -Elements of Double Entry -Book- Keeping-rules for journalising - Ledger accounts –Cash book-Banking transactions – Trial Balance- Method of Balancing accounts- the journal proper (simple problems).
Final accounts: Preparation of trading and profit and loss Account- Balance sheet (with simple problems) - Introduction to Accounting packages (Description only)

Reference Books:
Part I

1. Modern Economic theory – K.K Dewett
2. Economic Development – Michael Todaro, Addison Wesley Longman Ltd.
3. Business Environment in India – Mohinder Kumar Sharma.
4. Money, Banking, International Trade and Public Finance – D.M. Mithani, Himalaya Pub. House, New Delhi.
5. Indian Economy – Rudder Dutt and K.P.M Sundaran.
6. Intermediate Micro Economics – Hal R. Varian.
7. Micro Economics, 2nd Edition – Koutsiannis.

Part II

Internal Continuous Assessment *(Maximum Marks-50)*
Marks shall be awarded for Part I and Par II in the ratio 70:30, respectively

25 Marks - Tests (minimum 2)
15 Marks - Assignments (minimum 3) such as home work, problem solving, literature survey, seminar, term-project, programming exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern

Part I and Part II to be answered in separate answer books.

Part – I	***Economics***	
PART A:	***Short answer questions***	*10 x 3 marks = 30 marks*
	All questions are compulsory. There should be at least four questions from each module and not more than six questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*2 x 20 marks = 40 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	
Part II	***Accountancy***	
	Descriptive/Analytical/Problem solving questions	*2 x 15 marks = 30 marks*
	Candidates have to answer two questions out of three questions.	
		Maximum Total Marks: 100

08.403 MICROCONTROLLER-BASED DESIGN

L-T-P: 3 – 1 – 0 **Credits:4**

MODULE I (18 hours)

Introduction to microcontrollers – general architecture of microcontrollers and microprocessors, embedded processors.
Overview of the 8051 family – 8051 architecture – memory organisation, registers and I/O ports, addressing modes, instruction sets and assembly language programming.
C programming in 8051.

MODULE II (17 hours)

Programming 8051 timer/counter in assembly language and C.
8051 Interrupts – handling and programming.
Serial communication using 8051 – interfacing with RS232, serial port programming.

MODULE I (17 hours)

8051 interfacing – keyboard, LCD, ADC, DAC and stepper motor interface – interfacing to external memory.
Introduction to PIC microcontrollers and ARM processors.
Concept of Embedded Systems – embedded software and hardware development tools.

Text Books:

1. Muhammad Ali Mazidi, The 8051 Microcontroller and Embedded Systems, 2006, Pearson Education.
2. David E. Simon, An Embedded Software Primer, 2002, Pearson Education.

Reference Books:

1. ARM System Developer's Guide, Andrew N Sloss, Dominic Symes and Chris Wright, Elsevier 2005.
2. Design With PIC Microcontrollers, John B. Peatman, Pearson Education.
3. Kenneth Ayala, The 8051 Microcontroller, 3/e , Thomson Publishing , New Delhi.
4. David Seal, ARM Architecture Reference Manual.
5. Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design, Elsevier, 2

08.404 OBJECT ORIENTED TECHNIQUES (R F)

L-T-P: 2 – 1 – 0 **Credits:3**

MODULE I (10 hours)

Fundamentals of object-oriented design: Data Abstraction, Encapsulation, classes, Inheritance and Polymorphism, class hierarchies. *Designing an object-oriented system:* Identifying the classes, Assigning Attributes and Behaviour, finding relationship between classes, Arranging classes into hierarchies: A design example. A first look at C++: Using streams for input and output. *C++ enhancements to C:* Default Function Arguments, Placement of variable declarations, the scope resolution operation, the "const" Qualifier, overloaded functions. *References:* References as Aliases, references and pointers similarities and differences, references as function parameters, references as return values.

MODULE II (13 hours)

Introduction to classes: Declaring and using classes, class members, creation and destruction of objects, accessing data members, returning a reference, "const" objects and member function. *Classes and dynamic memory allocation:* New, delete operators, "this" pointer. Static members, friends, array of class objects.

MODULE III (16 hours)

Inheritance and polymorphism: Derived class and base class, derived class constructors, overriding member functions, public and private inheritance, virtual functions, polymorphism, multiple inheritance, classes within classes. *Operator overloading:* Overloading unary operator, overloading binary operator, data conversion. Generic functions, generic classes. File processing – formatted – unformatted and random files. Microsoft foundation classes : Strings, data structure. Representing classes and attributes using UML.

Text Books:

1. Teach yourself C++ - H. Schildt, Tata McGraw Hill.
2. Schaum's outline of programming with C++ – J.R. Hubbard.
3. C++ Programming from problem analysis to program design 3rd Edn. – D.S. Malik, Thomson Publications

Reference Books:

1. Object Oriented Programming in Microsoft C++ – Rober Lafore, Galgotia Book House.
2. Object Oriented Programming in Microsoft C++ – Balagurusamy.
3. Object Oriented Programming – Barkakti
4. Fundamentals of data structures in C++ – E. Horwitz, S. Sahni and D. Mehta, Universities Press (India)
5. Fundamentals of object oriented design in UML, 4th impression 2008 – Meilir P. Jones, Pearson Education (Chapter 4 – for UML part in Module III)

08.405 DATA STRUCTURES AND ALGORITHMS (R F)

L-T-P: 2– 2 – 0 **Credits: 4**

MODULE I (14 hours)

Introduction to programming methodologies – structured approach, stepwise refinement techniques, programming style, documentation – analysis of algorithms: frequency count. Study of basic data structures – vectors, arrays, records, stacks, queues and dequeues.

MODULE II (19 hours)

Logic characteristics of strings, physical representation for strings – linked lists – trees, binary tree traversals – graphs – applications. Storage management – free storage lists, reference counters, garbage collection, storage compaction, boundary tag method.

MODULE III (19 hours)

Internal and external sorting techniques – insertion sort, merge sorting, partition exchange sorting, heap sort. Searching algorithms – hashing. External sorting – sorting with disks, sorting with tapes.

Text Books:

1. Introduction to data structures with applications – J.P. Tremblay and P.G. Sorenson, TMH.
2. Fundamentals of data structures – E. Horowitz and S. Sahni, Computer Science Press.
3. Classic data structures – D. Samanta, PHI

Reference Books:

1. Theory and problems of data structures – Seymour Lipschuts, Schaum's series.
2. Algorithms + data Structures = Programs – M. Wirth, Prentice Hall Englewood cliffs.
3. A structured approach to Programming – J.K. Hugges and J.I. Michtm, Prentice Hall.
4. Fundamentals of data structures in C – E. Horwitz, S. Sahni and S. Anderson-Freed, Universities Press (India

08.406 DATABASE DESIGN

L-T-P: 3 – 0 – 0 **Credits: 3**

MODULE I (13 hours)

Introduction to database systems : traditional file system, database/DBMS distinction, approaches to building a database, data models, data independence, three schema architecture of a database, various components of a DBMS, E/R Model, Conceptual data modeling – motivation, entities, attributes and keys, relationships, E/R diagrams.
Relational Data Model: Concept of relations, schema-instance distinction, referential integrity and foreign keys, relational algebra operations, relational calculus, Converting database specification in E/R notation to the relational schema.

MODULE II (13 hours)

SQL – data definition in SQL, querying in SQL, embedded SQL.
Dependencies – importance of a good schema design, motivation for normal forms, dependency theory – functional dependencies, Amstrong's axioms, Membership and minimal covers, 1NF, 2NF, 3NF and BCNF, Decompositions and their desirable properties, Multi-valued dependencies and 4NF, Join dependencies and 5NF.

MODULE III (13 hours)

Data Storage and indexes – File Organisations, Primary and Secondary index structures, Hash based structures, B-Trees, B+ Trees.
Transaction Processing and Error Recovery - Concepts of transaction processing, ACID properties, Concurrency control, Serializabilty, Locking based protocols for Concurrency control, Logging and Recovery Methods.

Text Books:

1. Fundamentals of Database Systems, 5th Edition, – Ramez Elmazri and Shamkant B. Navathe, Addison Wesley, 2(
2. Database systems – Design, Implementation and Management, 7th Edition – Peter Rob and Carlos Coronell, Thomson Course Technology, 2007

Reference :

Data Base System concepts – Henry F Korth and Silberschatz, Mc Graw Hill.

08.407 DATA STRUCTURES LAB (R F)

L-T-P: 0 – 0 – 4 **Credits:4**

Programming exercises in C based on the course ***08.405 Data Structures and Algorithms.***
The exercises may include the following:-

1. Representation of sparse matrix – addition, multiplication and transpose of sparse matrices
2. Use of multidimensional arrays and structures
3. Linked list – singly linked list, circular linked list, and doubly connected linked list and application problems
4. String manipulation applications. Representation of polynomials, arithmetic operations on polynomials
5. Implementation of stacks using arrays and linked lists. Application problems using stacks – Maze problem, conversion between infix, postfix and prefix, expression evaluation etc.
6. Implementation of multiple stacks
7. Implementation of Queues using linked list and array – multiple Queues, Dequeues, priority queue and applications of queues
8. Creation and traversals of binary trees – counting nodes, finding height etc.
9. Creation of binary search tree – searching an item, insertion and deletion of nodes etc.
10. Implementation of sorting and searching algorithms

08.408 OBJECT ORIENTED PROGRAMMING LAB

L-T-P: 0 – 0 – 4 **Credits: 4**

Implementation of topics covered in 08.404 (Object Oriented Techniques) using Java or C++.

Standard Template Library – Containers, Associative Arrays, Iterators.

SEMESTER V

08.501 ENGINEERING MATHEMATICS (E R F B H)

L-T-P: 3 – 1 – 0 **Credits: 4**

MODULE I (18 hours)

Discrete and continuous random variables and their probability distributions - Probability distribution (density) functions - Distribution functions - Mean and Variance - Simple problems. - Binomial, Poisson, uniform and exponential distributions - Mean and Variance of the above distributions - Normal distribution - Properties of normal distribution - Computing probabilities using Binomial, Poisson, uniform, exponential and normal distributions.

MODULE II (16 hours)

Curve fitting - Principle of least squares - Fitting a straight line - Fitting a parabola - Linear correlation and regression - Karl Pearson's coefficient of correlation - Sampling distributions - Standard error - Estimation - Interval estimation of population mean and proportions (small and large samples) - Testing of Hypothesis - Hypothesis concerning a mean, Equality of means- Hypothesis concerning one proportion, difference of two proportions.

MODULE III (18 hours)

Joint probability density function - Properties - Marginal and conditional distribution - Independence - Random processes - Classification of random processes - Examples - Average values such as mean, autocorrelation, auto covariance, correlation coefficient of random processes - stationarity - strict sense stationary process - wide sense stationary process - Autocorrelation function and its properties - Power spectral density and its properties (no proof) - Related problems - Markov chains. Transition probability matrices - Chapman-Kolmogorov equation (no proof) - Poisson process - Mean and autocorrelation of Poisson process - Related problems.

Reference Books

1. *Probability, random variable and stochastic processes*, Papoulis and S.U. Pillai, 4/e, TMH
2. *Probability and Random Processes*, Veerarajan, 2/e, TMH
3. *Probability and Random processes with application to signal processing,* Stark and Woods, 3/e, Pearson Education
4. *Probability and Random Processes for Electrical and Computer Engineers*, Gubner, Cambridge University Press, 2006

08.502 ADVANCED MATHEMATICS & QUEUEING MODELS (RF)

L-T-P: 3 – 1 – 0 **Credits: 4**

MODULE I (18 hours)

General linear programming problem - Slack and surplus variables - Standard form - Solution of LPP - basic solution - Basic feasible solution - Degenerate and non-degenerate solutions - Optimal solution - Solution by simplex method - Artificial variables - Big-M method - Network Analysis-Project Scheduling- Construction of Project networks- Critical Path Method (CPM)-Identification of Critical path using CPM- Estimation of Floats-Total float, Free float, Independent Float-Project Evaluation and Review Technique(PERT)-Computation of expected completion times by PERT.

MODULE II (16 hours)

Partitioned matrices and matrix factorization - LU decompositions - Vector space and subspace - Null space and Column spaces - Bases - Co-ordinate systems - Dimension of vector space - Rank - Change of basis - Inner product space - Length and orthogonality - Orthogonal sets - Orthogonal projection - Gram-Schmidt process - Least square problem - Quadratic form - Constrained optimization of quadratic forms - Singular value decomposition (proof of the theorem are not included).

MODULE III (18 hours)

Queuing Theory- Queues-Characteristics of Queues-Kendal's notation-Random arrivals-Arrival and Departure Distributions-Types of Queues- Basic Queuing models- M/M/1:∞/FIFO - $P_n=\rho^n P_0$ (no proof)-Derivation of the following Characteristics
(a) Probability that queue size ≥ n (b) Average number of customers in the system
(c) Average length of the waiting line – Waiting time distribution (no proof) – Waiting time in the system – Waiting time in the queue - Little's Formulae – Problems based on the above results.
M/M/1:N/FIFO model – Formulae (without proof) for the average number of units in the system and in the queue and the average waiting time – Problems.
M/M/c:∞/FIFO model – Standard results (no derivation) - Problems.

Reference Books

1. *Linear Algebra with Applications*, David C Lay, Pearson Education
2. *Linear Algebra*, Schaum Series
3. *Linear Algebra*, Kenneth Hoffmann and Ray Kunze, PHI.
4. *Linear Algebra with Applications*, Gareth Williams, Jones and Bartlett publications
5. *Linear Algebra with Applications*, Gilbert Strang, Thomson Learning
6. *Linear Programming,* G. Hadly, Addison Wesley
7. *Operations Research,* Ravindran, Philips, Solberg, Wiley
8. *Operations Research,* Kanti Swarup, Manmohan.

08.503 THEORY OF COMPUTATION

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Introduction to the theory of computation. Finite state automata – description of finite automata, properties of transition functions, designing finite automata, NFA, finite automata with epsilon moves, 2-way finite automata, equivalence of NFA and DFA, Mealy and Moore machines, regular expressions, regular sets and regular grammars, pumping lemma for regular languages, closure properties of regular sets and regular grammars, applications of finite automata, decision algorithms for regular sets, minimization of FSA**.**

MODULE II (13 hours)

Chomsky classification of languages. Context-Free Grammar - derivation trees, ambiguity, simplification of CFLs, normal forms of CFGs, pumping lemma for CFGs, decision algorithms for CFGs, designing CFGs, PDA – formal definition, examples of PDA, Deterministic PDA, equivalence with CFGs.

MODULE III (13 hours)

Turing machines - basics and formal definition, language acceptability by TM, examples of TM, variants of TMs – multitape TM, NDTM, Universal Turing Machine, offline TMs, equivalence of single tape and multitape TMs. Recursive and recursively enumerable languages, decidable and undecidable problems – examples, halting problem, reducibility.

1

Text Books :

1. Introduction to Automata Theory, Languages and Computation – John E. Hopcroft , Jeffrey D.Ullman and Rajeev Motwani, Pearson Education.

Reference Books :

1. Introduction to The Theory of Computation (Second Edition), Michael Sipser, Thomson.
2. The Theory of Computation, Bernard M. Moret, Pearson Education.
3. Introduction to Automata Theory and Formal Languages – Peter Linz, Narosa Publishing.
4. Switching and Finite automata theory – Kohavi, Tata McGraw Hill

08.504 SYSTEMS PROGRAMMING (RF)

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Systems Programming – What is systems programming, Difference between systems programming and application programming – Dependence on systems programming on hardware – System software and Machine architecture. SIC & SIC/XE Architecture and Programming. Traditional (CISC) machines – VAX architecture, Pentium Pro architecture, RISC machine – ultra SPARK, Power PC.

MODULE II (13 hours)

Assemblers – Basic assembler functions – machine dependent assembler features – machine independent assembler features – Hand assembly of SIC/XE programming. Assembler design options – one pass assembler, multi pass assembler – assembler implementation – MASM, SPARC assemblers, Assemblers Vs Compilers.
Loaders and Linkers basic loader functions, machine dependent loader features, machine independent loader featured, loader design options – linkage editors, dynamic linkage editors, dynamic linking, bootstrap loaders, examples – DOS linker.

MODULE III (13 hours)

Macro processors – basic macro processor functions – machine dependent and machine independent macro processor architectures – design options – implementation examples – MASM, ANSI C macro processors. Text Editors – overview of the editing process – user interface, editor structure. Debuggers – debugging functions and capabilities, relationship with other parts of the system – user interface criteria.

Text Books:
1. System Software-An Introduction to System Programming – Leland L. Beck, Pearson Education.

Reference Books:
1. Systems Programming – John J. Donovan, Tata McGraw Hill.
2. Operating Systems and Systems Programming – D.M. Damdhere, Tata McGraw Hill.

08.505 OPERATING SYSTEMS

L-T-P: 3 – 1 – 0 **Credits:4**

MODULE I (15 hours)

Introduction : Basic concepts – terminology. Historical perspective - early systems - types of OS - batch processing - multiprogramming - time sharing - real-time system - functions and components of an operating system - OS services -multiprocessor system - distributed system.
Information management: File concepts - file system - directory structure - gaining access to files - basic file system calls - sharing and security - file protection - allocation methods - implementation issues.

MODULE II (21 hours)

Processor management: CPU scheduling - scheduling concepts - scheduling algorithms - concurrent processes. Critical Section Problem and solutions - semaphores - classical problems in process synchronization.
Memory management : Basics - swapping - fixed partitions - variable partitions - overlay - paging - segmentation - segmented paging - virtual memory concepts - demand paging - page replacement - space allocation policies - dynamic linking.

MODULE III(16 hours)

Device management : Physical characteristics – disk scheduling algorithms - sector queuing - device drivers.
Dead locks : Deadlock problem - characteristics - prevention - avoidance - detection - recovery from dead lock - combined approach to dead lock handling.
Protection : Goals of protection - mechanisms and policies - access matrix and its implementation - dynamic protection structures - security.

Text Books:

Operating System Concepts – J. L. Peterson and A. Silberschatz, Addison Wesley.

Reference Books:

1. Operating System Principles – P. Brinch Hansen, Prentice Hall.
2. Operating Systems - Gary Nutt, Pearson Education.

08.506 DATA COMMUNICATION

L-T-P: 2 – 1 – 0 **Credits:3**

MODULE I (12 hours)

Communication model- Simplex, half duplex and full duplex transmission.
Time Domain and Frequency Domain concepts - Analog & Digital data and signals - Transmission Impairments - Attenuation, Delay distortion, Noise - Different types of noise - Channel capacity - Shannon's Theorem - Transmission media - twisted pair, Coaxial cable, optical fiber, terrestrial microwave, satellite microwave - synchronous and Asynchronous transmission.

MODULE II (13 hours)

Sampling theorem - Encoding digital data into digital signal - NRZ, Biphase, Multilevel binary - Encoding digital data into analog signals - ASK, FSK, PSK - Encoding analog data into digital signals - PCM, PM, DM - Encoding analog data into analog signals - AM, FM, PM - Multiplexing - TDM, FDM, WDM & DWDM.

MODULE III (14 hours)

Error Detecting and correcting codes. Error detection - parity check, CRC, VRC. Forward Error Correction - Hamming codes, Block codes, Convolution codes. Basic principles of switching - circuit switching, packet switching, message switching.
Basics of wireless communication- Introduction to WiFi, WiMax, GSM, GPRS

Text Books:
1. Data and Computer Communications, Eighth Edition - William Stallings - PHI
2. Data Communications and Networking, Fourth Edition - Behrouz A Forouzan, Tata McGraw Hil

References :

. Computer Networks, Fourth Edition – Andrew S Tanenbaum, PHI.

08.507 DIGITAL CIRCUITS LAB

L-T-P: 4 – 0 – 0 **Credits: 4**

1 Realization of digital gates
2 Realization of flip-flops
3 Design and implementation of a counter
4 Design and implementation of a shift register
5 Multiplexer / Demultiplexer
6 Timer Circuits (using 555)
7 Experiments using the 8051 microcontroller

08.508 DATABASE LAB

L-T-P: 4 – 0 – 0 **Credits: 4**

1. Familiarization of creation of databases and SQL commands (DDL, DML and DCL).Suitable exercises to practice SQL commands may be given.
2. Write SQL procedure for an application which uses exception handling.
3. Write SQL procedure for an application with cursors.
4. Write a DBMS program to prepare reports for an application using functions.
5. Write SQL block containing triggers and stored procedures.
6. Develop a menu driven, GUI based user friendly database application in any one of the domains such as Banking, Electricity Billing, Library management, Payroll, Insurance, Inventory, Health care etc. integrating all the features specified in the above exercises.

SEMESTER VI

08.601 COMPILER DESIGN (RF)

L-T-P: 3 – 1 – 0
Creidts: 4

MODULE I (18 hours)

Introduction to compilers and interpreters – overview of compilation, issues in compilation – structure of a compiler – compiler writing tools – bootstrapping – notations and concepts for languages and grammars – regular expressions – context free grammar, derivations and parse trees, BNF notations. Context of a lexical analyzer – construction of lexical analyzer, deterministic and non-deterministic finite automata.

MODULE II (18 hours)

Compile time error handling, error detection, reporting, recovery and repair. Basic parsing techniques – Top down parsing – recursive descent parser, predictive parser simple LL(1) grammar. Bottom up parsers, operator precedence parser, LR grammar, LR(0), SLR(1), LALR(1) parsers.

MODULE III (16 hours)

Syntax directed translation schemes, intermediate codes, translation of assignments, translation of array reference, Boolean expressions, case statements, back patching, code optimization, loop optimization and global optimization, sources of sample code generation.

Text books:

1. Compilers: Principles, Techniques and Tools (Second Edition) - Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson Education.
2. Compiler Design – Santanu Chattopadyaya, PHI.

Reference Books :

1. Engineering a Compiler (Second Edition) - Keith D Cooper & Linda Torczon, Elsevier.
2. Modern Compiler Implementation in C - Andrew W. Appel, Cambridge University Press.
3. Compiler Construction – Principles and Practice by Kenneth C. Louden, Cengage Learning.
4. Algorithms for Compiler Design – O.G. Kakde, Cengage Charles River Media.
5. Principles of Compiler design – V. Raghavan, Tata McGraw-Hill.

08.602 COMPUTER NETWORKS

L-T-P : 2 – 1 – 0 **Credits: 3**

MODULE I (12 hours)

Introduction – Uses – Network Hardware – LAN –MAN – WAN, Internetworks – Network Software – Protocol hierarchies – Design issues for the layers – Interface & Service – Service Primitives. Reference models – OSI – TCP/IP.
Data Link layer - Design Issues – Flow Control and ARQ techniques. Data link Protocols - HDLC DLL in Internet.

MODULE II (13 hours)

MAC Sub layer – IEEE 802 FOR LANs & MANs. Bridges - Switches - High Speed LANs - Gigabit Ethernet.Wireless LANs 802.11 a/b/g/n, 802.15.
Network layer – Shortest path routing – Flooding – Distance Vector Routing – Link State Routing – RIP - OSPF – Routing for mobile hosts – Congestion control algorithms. QoS. MPLS.

MODULE III (14 hours)

Internetworking – Network layer in internet – IP Addressing – Classful and Classless IP Adressing, Subnetting. Internet Control Protocols – ICMP, ARP, RARP, BOOTP. Internet Multicasting. IGMP. Exterior routing protocols - BGP. IPv6 – addressing – issues.
Transport Layer – TCP & UDP.
Network Management – SNMP. Voice over IP - H.323 & SIP standards. Gatekeeper.

Text Books:

Computer Networks, Fourth Edition – Andrew S Tanenbaum, PHI.

References:

1. Data Communications and Networking - Behrouz A Forouzan, Fourth Edition, Tata-McGraw Hill
2 .Data and Computer Communications, Eighth Edidtion – William Stallings, PHI.
3 .Hand book of Computer Communications Standards, Volume 1 – Willman Stallings, PHI.
4. An Engineering Approach to Computer Networks – Keshav, Addison Wesley.

08.603 SOFTWARE ARCHITECTURE

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Modeling as a design technique – UML - Class Modeling –class diagrams – Links and associations – Generalization and inheritance –Navigation of Class Models – State Modeling – Events – Signal event - change event – states – state diagrams – Activity effects - Interaction Modeling – use case models –use case diagrams – sequence models – Activity models.

MODULE II (13 hours)

Software Design principles – Correctness and Robustness – Flexibility, Reusability and Efficiency – Trade offs among robustness, flexibility, reusability and efficiency – Design patterns – creational, structural and behavioral design patterns - characteristics of design patterns – delegation and recursion.

MODULE III (13 hours)

Software Architecture – Functionality and Architecture – Architecture and quality attributes – Availability tactics – Modifiability tactics – Performance tactics – Security tactics – Testability tactics – Usability tactics – Relationship of tactics to architectural patterns – Documenting Software architecture.

Text Books:

1. Object-Oriented Modeling and Design with UML (2nd Ed.), Michael Blah, James Rumbaugh, Pearson [M I]
2. Software Design – From Programming to Architecture, Eric Braude ,Wiley[M II]
3. Software Architecture in Practice (2nd Ed.), Len Bass, Paul Clements, Rick Kazman Pearson [M III]

References:

1. Software Architecture, Mary Shaw, David Garlan, PHI.
2. Software Architect BOOTCAMP 2nd Ed. Raphael Malveau, Thomas J Mowbray, Pearson.

08.604 INTERNET TECHNOLOGY

L-T-P: 3 – 1 – 0 **Creidts: 4**

MODULE I (17 hours)

Introduction - Web Browsers and Web Servers – URL.
Web Content Preparation - HTML, Cascading Style Sheets, JavaScript (Introduction to Scripting, Control Statements, Functions, Arrays, Objects), DHTML (Object Model and Collections, Event Model), XML (Creating Markup with XML -XML Namespaces, Document Type Definitions and Schema, Document Object Model, DOM Methods, Simple API for XML, Extensible Stylesheet Language, Web Services).

MODULE II (18 hours)

Protocols- HTTP, FTP, TELNET, SMTP, POP3, IMAP – MIME - Web Servers – IIS , Apache Web Server - Proxy Server - Search Engines - Content Display - Browsers, Plug-ins, Helper Applications.

Java – Packages and Interfaces, Exception Handling, Multithreaded Programming, Strings, I/O, Applets, Event Handling, AWT components, Swing components.

MODULE III (17 hours)

Network Programming in JAVA – Looking Up Internet Addresses, Sockets for Clients, Sockets for Servers, Non-Blocking I/O, UDP Datagrams and Sockets – RMI - Persistence - Java Beans – CORBA, IDL.

Text Books:

1. Internet & World Wide Web – How To Program (Third edition), H.M. Deitel, P.J. Deitel, A.B.Goldberg, Pearson Education.
2. Programming the World Wide Web 2009 (Fifth edition), Robert W. Sebesta, Pearson Education.
3. Java2 – The Complete Reference, Herbert Schildt, Tata McGraw Hill.
4. Java Network Programming (Third edition), Elliotte Rusty Harold, O'Reilly.
5. Component Software: Beyond Object-Oriented Programming, Clemens Szyperski, Pearson Education.
6. Inside CORBA, Mowbray, Pearson Education.

08.605 COMPUTER GRAPHICS

L-T-P: 2 – 1 – 0 **Credits:3**

MODULE I (12 hours)

Basic concepts in Computer Graphics – Types of Graphic Devices – Interactive Graphic inputs – Basic Raster Scan Graphics – Line Drawing Algorithms – Circle Generation Algorithms - Scan Conversion – frame buffers – solid area scan conversion – polygon filling.

MODULE II (13 hours)

Two dimensional transformations – Homogeneous coordinate systems – matrix formulation and concatenation of transformations – Windowing concepts – two dimensional clipping. Introduction to graphics in three dimension – specification of a 3D view - 3D transformations

MODULE III (14 hours)

Projections – Parallel and perspective projections – vanishing points – Hidden elimination – Back face removal, Z- Buffer algorithm, scan line algorithm. Image processing – introduction – digital image representation – relationship between pixels – gray level histogram – equalization – edge detection – Robert, Sobel, Canny edge detectors. Scene segmentation and labeling – region-labeling algorithm – perimeter measurement.

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Text Books:

1. Computer Graphics – Donald Hearn and M. Pauline Baker, PHI
2. Principles of Interactive Computer Graphics – William M. Newman and Robert F. Sproull.
3. Pattern Recognition and Image Analysis – E. Gose, R. Johnsonbaugh, S. Jost.. PHI

Reference Books

1. Procedural Elements for Computer Graphics – David F. Rogers
2. Image Processing, Analysis, and Machine Vision – M. Sonka, V. Hlavac, and R. Boyle, Thomson India Edition.

08.606 EMBEDDED SYSTEMS

L-T-P: 3 – 1 – 0 **Credits: 3**

MODULE I (18 hours)

Introduction - Definition and classification – Processors and hardware units in an embedded system – Software embedded into the system – Embedded system-on-chip - Processor and memory. organization. I/O Devices - Synchronous, iso-synchronous and asynchronous communications from serial devices -Internal serial communication devices - Parallel port devices - Timer and counting devices - 1^2C, CAN, USB and advanced serial high-speed bus - PCI, PCI-X and advanced buses - Device drivers -Interrupt servicing mechanism.

MODULE II (16 hours)

Programming concepts - Assembly language vs high level language - C Program Elements - Queues, stacks and lists - Concepts of embedded programming in C++ - C compilers – Cross compiler – Optimization of memory usage.

MODULE III (18 hours)

Real-time operating systems - RTOS services - Structures - Resource management – File system organization and implementation – I/O subsystems – Interrupt handling - Task scheduling models - Handling of interrupt latency and deadlines - Performance metrics. Inter-process communication and synchronization – Semaphores – Priority inversion problem - Deadlock situations – Signals – Message queues – Mailboxes – Pipes – Sockets.

Text Books:
Embedded Systems - Architecture, Programming and Design, Raj Kamal, TATA McGraw Hill, 2004

08.607 INTERNET LAB

L-T-P: 0 – 0 – 4 **Credits:4**

1. Creation of HTML documents - use of external style sheets, ordered lists, tables, borders, padding, colors, embedded maps.
2. JavaScript - obtaining information on the browser and the operating system, timed JavaScript redirect, JavaScript features.
3. XML – conversion to HTML. Cascading Style Sheets, XSLT. XML document parsing using DOM.
4. Java applets – labels, lists, text fields and animation.
5. Java network programming – simple web client, e-mail client, TCP/IP client and server, chat application with datagram sockets and datagram packets.
6. Java RMI.
7. CORBA.
8. Server configuration – web server, proxy server.

08.608 COMPUTER GRAPHICS LAB

L-T-P: 0 – 0 – 4 **Credits: 4**

2D Graphics: Drawing Elementary figures (line, Polygon), Polygon Filling (Boundary fill, Flood fill and Scan fill) , Transformations (Scaling, Rotation, Reflection, Translation. Shear) Windowing and clipping (Polygon and line clipping). Interactive Graphics: Interactive input techniques (mouse programming).

2D Animations using primitives (eg : man cycling along a road, a war aircraft bombing a ship, etc).

3D Graphics: Curves and Surfaces, Clipping, Hidden line and surface removal, Surface rendering, Rotation of a 3D object about arbitrary axis.

Basics of flash animation : Motion Tweening in flash player

SEMESTER VII

08.701 SOFTWARE PROJECT MANAGEMENT

L-T-P : 2 – 1 – 0 **Credits: 3**

MODULE I (12 hours)

Software - characteristics - Process: Process-layered technology-Software process models – Waterfall model - Incremental models, Evolutionary models. Project Management concept: People – Product-Process-Project.

MODULE II (14 hours)

Software process and project metrics: - Measures- Metrics and indicators- Software measurements-metrics for software quality-Software project planning: Planning objectives - software scope-resources-software project estimation-Decomposition Techniques –Empirical estimation models-COCOMO model. Risk management: software risks-risk identification-risk projection-risk mitigation, monitoring and management-safety risks and hazards-RMMM plan.

MODULE III (13 hours)

Project scheduling and tracking: Basic concepts-relation between people and effort-defining task set for the software project-selecting software engineering task-refinement of major task-defining a task network-Scheduling-project plan. Software configuration management: baselines--the SCM process-identification of objects in software configuration-Version control-Change control-Configuration audit-status reporting-Software Quality Assurance-SQA activities.

Text Book:

1. Software Engineering – Roger S. Pressman, Sixth Edition. McGraw Hill International

References:

1. Software Project Management: A unified framework – Walker Royce, Pearson Education
2. Software Project Management in Practice – Pankaj Jalote, Pearson Education

08.702 INTERNETWORKING

L-T-P: 3 – 1 – 0 **Credits: 4**

MODULE I (17 hours)

Internet Architecture, Classful Internet Addresses, Mapping Internet Addresses to Physical addresses (ARP), Determining an Internet address at start-up (RARP), Connectionless Datagram Delivery (IPV4) , Forwarding IP datagrams, Error and Control Messages (ICMP), Classless and Subnet Address Extensions (CIDR), Protocol Layering, User datagram Protocol, Reliable Stream Transport Service.

MODULE I (18 hours)

Routing Architecture : Cores, Peers, and Algorithms, Routing Between Peers (BGP), Routing Within an Autonomous System (RIP, OSPF), Internet Multi casting, IP Switching and MPLS, Private Network Interconnection (NAT, VPN), Bootstrap and Autoconfiguration (DHCP).

MODULE I (17 hours)

Applications - DNS, Remote Login and Desktop (TELNET, SSH), File Transfer and Access (FTP, TFTP, NFS) , Electronic Mail (SMTP, POP, IMAP, MIME), WWW (HTTP), Voice and Video Over IP (RTP, RSVP, QoS).

Text Books :

1. Internetworking with TCP/IP - Volume I, Principles, Protocols and Architecture (5th Edition), Douglas E.Comer, PHI 2009
2. The Internet and Its Protocols, Adrian Farrel, Elsevier 2005.

08.703 CRYPTOGRAPHY

L-T-P: 2 – 1 – 0 **Credits :3**

MODULE I (12 hours)

Introduction to cryptology :- Cryptography and cryptanalysis, Aspects of security, Cryptanalytic attacks. Classical cipher systems - Transposition ciphers, Substitution ciphers, Hagelin machine, Statistics and cryptanalysis. The information theoretical approach - information measure and absolute security, unicity distance, Error probability and security.

MODULE II (14 hours)

The DES algorithm :- Characteristics, Alternative descriptions, Analysis of the DES, DES modes. IDEA (International Data Encryption Algorithm).
Shift Registers :- Stream and block enciphering, The theory of finite state machines, shift Registers, random properties of shift register sequences, generating function, Cryptanalysis of LFSRs, Non-linear shift registers.
Public Key Systems :- Introduction, RSA system, Knapsack system, Cracking the Knapsack system, Public key systems based on elliptic curves.

MODULE III (13 hours)

Authentication and integrity :- Protocols, Message integrity, Entity authentication with symmetrical algorithm, Message authentication with a message authentication code (MAC), Message authentication with digital signatures, Zero - knowledge techniques.
Key Management :- General aspects of key management, Key distribution for asymmetrical systems, Key distribution for symmetrical algorithms, Network security, Fair cryptosystems.

Text Books :
1. Basic Method of Cryptography, Jan C. A. Van Der Lubbe, CAMBRIDGE UNIVERSITY PRESS
2. Cryptography and Network Security - Behrouz A. Forouzan, Tata McGraw Hill.

08.704 WEB APPLICATIONS DEVELOPMENT

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Introduction - Web architecture - web application lifecycle - XML and J2EE. Design and development of a J2EE application - J2EE Layers, Application Components, J2EE Architecture, Development methodology - Task list for building J2EE Applications - database design - defining the application - creating the interface, building pages, creating data access objects, validating the code. JDBC: Architecture - JDBC API, Retrieving and updating Data, SQL-to-Java Data Types, JDBC Execution Types, Metadata, Scrollable Resultsets, transaction support, Batch Statements.

MODULE II (13 hours)

Servlets: Introduction to Servlets, Benefits of Servlets, use as controller in MVC, basic HTTP, servlet container, Servlets API, javax.servelet Package, Reading Servlet parameters, service method detail, HTML clients, servlet lifecycle, HTTP response header, session management, dispatching requests, Servlets with JDBC, web applications. Java Server Pages: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Setting attributes, Error Handling and Debugging, Using JavaBeans Components in JSP Pages, Sharing Data Between JSP pages -Passing Control and Data between Pages – Sharing Session and Application Data – Application Models - MVC Design.

MODULE III (13 hours)

Enterprise JavaBeans : Overview, distributed programming, EJB framework, Session and entity beans, Stateless and tateful session bean, Bean attributes, Parts of a Bean, container-managed persistence (CMP) and bean managed - lifecycle of EJB - java message service (JMS) and message driven beans (MDB), distributed programming services, CORBA and RMI - Transaction management, Security, deployment, personal roles for EJB Development, building session beans - creating session beans - Entity beans.

Text Books :

1. J2EE UNLEASHED – Joseph J. Bambara, Paul R.Allen, Mark Ashnault, Ziyad Dean, Thomas Garben, Sherry Smith – SAMS Techmedia

2. Java Servlet Programming, Second Edition,Jason Hunter, William Crawford,O'Reilly Media

3.Mastering EJB(2nd Edition) – Ed Roman, Scott Ambler, Tyler Jewell – John Wiley Publications 2003.

Reference Books :

1. The J2EE Tutorial- Stepahnie Bodoff, Dale Green, Kim Hasse, Eric Jendrock, Monica Pawlan, Beth Stearns-Pearson Education –Asia.

2. Java Server Pages –Hans Bergsten, SPD O'Reilly

08.705A ALGORITHM ANALYSIS AND DESIGN

L-T-P: 4-0-0 **Credits :4**

MODULE I (16 hours)

Concepts in algorithm analysis – the efficiency of algorithms, average and worst – case analysis, Asymptotic notation, time and space complexity, Recurrences – substitution method, iteration method and master method, Analysis of sorting algorithms – insertion sorting, heaps, maintaining the heap property, building heap, heap sort algorithm, priority queues. Description of quick sort, randomized version of quick sort.

MODULE II (18 hours)

Height balanced trees – AVL Trees – Red-Black trees – Steps involved in insertion and deletion – rotations, Definition of B-trees – basic operations on B-trees, Algorithm for sets – Union and Find operations on disjoint sets, Graphs – DFS and BFS traversals, Spanning trees – Minimum Cost Spanning Trees, Kruskal's and Prim's algorithms, Shortest paths – single source shortest path algorithms, Topological sorting, strongly connected components.

MODULE III (18 hours)

Algorithm Design and analysis Techniques – Divide and Conquer techniques – Merge Sort, Integer multiplication problem, Strassen's algorithm, Dynamic programming – Matrix multiplication problem, Greedy algorithms – Knapsack problem, Back tracking – 8 Queens problem, Branch and Bound – Travelling Salesman problem. Definitions and Basic concepts of NP-completeness and NP-Hardness. Study of NP-Complete problems.

Text Books :

1. Introduction to Algorithms – Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, PHI.
2. Fundamentals of Computer Algorithms – Horowitz and Sahni, Galgotia Publication.
3. Fundamentals of sequential and parallel algorithms – Kenneth A. Merman and Jerome L. Paul, Vikas Publishing

Reference Books :

1. The Design and Analysis of Computer Algorithms – A.V Aho, J.E. Hopcroft and J.D. Ullman, Addison Wesley Publishing Company.
2. Introduction to the design and analysis of algorithms – A. Levitin, Pearson Education
3. Computer algorithms - Introduction to design and Analysis – Sara Baase, Allen Van Gelder

08.705B SIMULATION AND MODELING

L-T-P: 4 – 0 – 0 **Credits : 4**

MODULE I (18 hours)

Basic simulation Modeling – Discrete-event simulation – simulation of a single-server queuing system – simulation of an inventory system – steps in a simulation study – continuos simulation – combined discrete-continuous simulation – Monte-Carlo simulation – Advantages – disadvantages – and pitfalls of simulation.

MODULE I (17 hours)

Modeling complex systems - Single server queuing simulation Time- shared computer model – Job-shop model.

MODULE I (17 hours)

Simulation software – comparison of simulation packages with programming languages – classification of simulation software – desirable software features – General purpose simulation packages – Object – oriented simulation.

Text Book :

Simulation Modeling and Analysis 4th Ed. Averill M. Law, TMH

Reference :

System Simulation, Geoffrey Gordon, PHI

08.705C PRINCIPLES OF PROGRAMMING LANGUAGES

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (17 hours)

Names, Scopes, and Bindings**:-** Names and Scopes, Binding Time, Scope Rules, Storage Management, Aliases, Overloading, Polymorphism, Binding of Referencing Environments, Separate Compilation.
Control Flow**: -** Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion, Nondeterminacy.
Data Types**:-** Type Systems, Type Checking, Records and Variants, Arrays, Strings, Sets, Pointers and Recursive Types, Lists, Files and Input/Output, Equality Testing and Assignment.

MODULE II (18 hours)

Subroutines and Control Abstraction: **-** Static and Dynamic Links, Calling Sequences, Parameter Passing, Generic Subroutines and Modules, Exception Handling, Events.
Functional and Logic Languages:- Lambda Calculus, Overview of Scheme, Strictness and Lazy Evaluation, Streams and Monads, Higher-Order Functions, Logic Programming in Prolog, Limitations of Logic Programming.
Data Abstraction and Object Orientation:- Encapsulation, Inheritance, Constructors and Destructors, Dynamic Method Binding, Multiple Inheritance, Smalltalk Object Model.

MODULE III (17 hours)

Innovative features of Scripting Languages:- Scoping rules, String and Pattern Manipulation, Data Types, Object Orientation.
Concurrency:- Threads, Coroutines, Synchronization, Language-Level Mechanisms.
Run-time program Management:- Virtual Machines, Late Binding of Machine Code, Reflection, Symbolic Debugging, Performance Analysis.
Introduction to Formal Semantics and Program Verification:- Operational Semantics, Denotational Semantics, Axiomatic Semantics, Proofs of Program Correctness, Assertions in C and JAVA.

Text Books:

1. Programming Language Pragmatics, Third Edition by Michael L Scott, Morgan Kaufmann Publishers (Including the companion CD with the book).
2. Programming Languages – Principles and Practice, Second Edition by Kenneth C. Louden, Cengage Learning

Reference Books:

1. Programming Languages – Principles and Paradigms, Second Edition by Allen B. Tucker and Robert E. Noonan, Tata McGraw-Hill Edition
2. Concepts of Programming Languages, Eighth Edition by Robert W. Sebesta, Pearson Education.
3. Programming Languages – concepts & constructs, Second Edition by Ravi Sethi, Pearson Education

08.705D COMMUNICATIVE ENGLISH & TECHNICAL WRITING
(Common with 08.704(3) of CSE)

L-T-P: 3-1-0 **Credits: 4**

MODULE I (20 hours)

Listening, Reading, Speaking and Writing skills.
Listening Skills: Listening for general content- Intensive listening-Listening for specific information.
Speaking Skills: Oral practice-Describing objects/situations/people-Role play-Just A Minute/Group Discussion- informal letters-essentials of telephonic conversation-invitations-minutes of a meeting.
Reading Skills: Skimming the text- exposure to a variety of technical articles, essays, graphic representation, and journalistic articles.
Writing Skills: Skills to express ideas in sentences, use of appropriate vocabulary -sentence construction-paragraphs development-note making-editing a passage and essay writing.
Basics of Technical Communication.
Technical communication- features, Distinction between general and technical communication-language as a tool of communication- levels of communication-interpersonal, organizational, mass communication-the flow of communication: upward, downward and lateral-importance of technical communication- barriers to communication.

MODULE II (20 hours)

Forms of Technical communication.
Business letters-sales and credit letters, letter of enquiry, letter of quotation, placing order. Job application and resume. Official letters-govt. letters, letter to authorities. Reports-types, significance, structure and style, writing reports, condensing .Technical proposals-writing a proposal –the steps involved.Technical papers- projects- dissertation- thesis writing. Preparing audio-visual aids.

MODULE III (12 hours)

A non-detailed study of the autobiography: "Wings of Fire-an autobiography by APJ Abdul Kalam". *Students should read the book on their own and selected topics may be discussed in the* class.

Reference Books:
1. Basic Communication Skills for Technology – Andrea J Rutherford. *Pearson Education.*
2. Business Correspondence and Report Writing – Mohan K and Sharma R C, TMH New Delhi.
3. Effective Technical Communication – Barun K Mitra. Oxford University Press, New Delhi.
4. Everyday Dialogues in English – Robert J Dixson, PHI.

08.706A COMPUTER PERIPHERALS & INTERFACING

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (17 hours)

Introduction-Motherboard Components -Processors-Introduction-Microprocessor Components-Desktop processors-Microprocessor Associates-Microprocessor Packaging-Microprocessor Sockets. Memory- Introduction-DRAM, SDRAM, DDR, DDR2, DDR3. RAM slots-types- Introduction-SIMM, DIMM, RIMM, Micro DIMM, SoDIMM. Expansion Slots- PCI slot, AGP Slots, PCI-Express slots, USB, Serial ports, Parallel ports.

MODULE I (18 hours)

Input / Output Devices – Scanners –flat bed scanner-working process. Printers – Impact and Non Impact Printers– Dot matrix, working – Laser printers, working– Inkjet printers, working. Mechanical mouse and Optical mouse-working. Storage interfaces – ATA/IDE -SATA-SCSI.

MODULE I (17 hours)

Display adapters- introduction- VGA, SVGA, XGA, SXGA, WXGA, WUXGA,WQXGA– Serial access mass storage devices - Magnetic tapes and Streamer tapes - Random access mass storage devices -Magnetic disks, Magneto Optical disks, read and write process- Hard disks -tracks and sectors-operation of hard disk–. Introduction-CDs, DVDs, Blu-ray Discs.

1

Text Books :

1. Upgrading and Repairing PCs – ScottMueller, Pearson Education.
2. David Groth, A+ Study Guide - Core Module - - B.P.B
3. Hardware and Networking-Vikas Gupta-Dreamtech press.

Reference :

The Indispensable PC Hardware Book – Hans Peter Messmer, Addison Wesley/Pearson Education

08.706B OPTIMIZATION TECHNIQUES

L-T-P: 4 – 0 – 0 **Credits : 4**

MODULE I (17 hours)

General methods of solving operations research models, scientific methods in operations research - Mathematical formulation of linear programming problem, Graphical solution, Simplex algorithm and its applications, use of artificial variables, quality, economic interpretation, degeneracy and elementary sensitivity analysis – Transportation problem – mathematical formulation – initial feasible solution by VAM method, degeneracy, unbalance transportation problem – Assignment problem, mathematical formulation, the assignment algorithm, unbalanced assignment problems

MODULE II (18 hours)

Replacement model, types of replacement problems, problem of choosing between two machines, determination of best replacement age of machine using present worth and discount rate, group replacement - game theory – definition of a game – two person zero sum game – graphical solution, application in marketing, advertisement etc. – decision theory – decision under risk – expected value of profit or loss, expected variance criterion, decision trees, decision under uncertainty – the Laplace criterion, the mini-max criterion, minimax regret criterion, Hurvitz criterion.

MODULE III (17 hours)

Network analysis – project scheduling by PERT – CPM, arrow head representation, calculation of critical path, probability and cost consideration in project scheduling. Construction of the time chart-resource leveling.

Text Books :

1. Operations research, B S Goel, S K Mittal
2. Operations Research , Frederick S Hiller, Generald J Liebermann
3. Principles of Operations Research for managers, Frank S Budnick, Dennis McLeavy, Richard Mojena

08.706C DATA MINING TECHNIQUES
(Common with 08.705(4) of CSE)

L-T-P: 4-0-0 **Credits:4**

MODULE I (17 hours)

Fundamentals of data mining - Basic data mining tasks, Issues, DM versus KDD Data preprocessing- Aggregation, Sampling, Dimensionality reduction, Feature subset selection, Feature creation, Discretization and Binarization, Variable transformation. Data warehousing and OLAP Technology – Introduction to Data warehouse, Multidimensional data model, Data warehouse architecture and implementation, Data warehousing and data mining, System architecture.

MODULE II (17 hours)

Association and Correlation - Basic algorithms, Advanced association rule techniques, Measuring the quality rules, From association mining to correlation analysis, Constraint based association mining.
Association and Prediction - Classification and prediction, Issues, Algorithms - Decision tree-based, statistical-based, Distance-based, Neural network and rule-based. Support vector machines, Other classification methods, Prediction, Accuracy and Error measures, Evaluation of accuracy of classifier or predictor, Increasing the accuracy, model selection.

MODULE III (18 hours)

Cluster analysis – Types of data in cluster analysis, classification of major clustering methods. Partitional algorithms - Hierarchical methods, Density based methods, Grid based methods, Model based clustering methods. Clustering large data bases, Constraint based cluster analysis.
Advanced Topics - Multidimensional analysis and descriptive mining of complex data objects, Spatial mining, Multimedia mining, Text mining, Web mining, Temporal mining.

1

Text Books :

1. Data Mining : Concepts and Techniques - Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers.
2. Data Mining : Introductory and Advanced Topics - Margaret H. Dunham, S.Sridhar, Pearson Education.

Reference Books :

1. Building the Data Warehouse - William H. Inmon, Wiley Publishing.
2. Data mining techniques - Arun K. Pujari, Universities Press.
3. Data Warehousing, Data Mining and OLAP – A. Berson and S. J. Smith, Tata McGraw-Hill.

08.707 COMPUTER NETWORKS LAB

L-T-P: 0-0-4 **Credits : 4**

Experiments Using Routers and Switches

1. Basic router configuration.
2. Implementing static routing.
3. Implementing dynamic routing using RIP
4. Implementing dynamic routing using OSPF
5. Implementing dynamic routing using EIGRP
6. Basic switch configuration
7. VLAN configuration
8. VTP, VTP pruning.
9. Implement inter-VLAN routing
10. Backup and recovery of configuration files of a router using TFTP server.
11. Access Control List (Standard and Extended)
12. Configuring PPP.

Practice Experiments

Familiarization of different Network Cables- Color coding - Crimping.

Familiarization of Wireless Access Point.

08.708 SEMINAR / PROJECT DESIGN

L-T-P: 0 – 0 – 4 **Credits : 4**

Each student should present a seminar of 30 minutes duration on any one of the emerging topics in Information Technology. The seminars should preferably be based on research papers from reputed journals and should be done under the guidance of a faculty member of the department. A seminar report should be prepared and submitted.

Each student along with other team members and under the supervision of a faculty member should identify a problem for the final year project. It should be based on the core subjects of the discipline and could involve software and/or hardware implementation. The preliminary work for the project - literature survey, design etc. - should be carried out in this semester.

An evaluation should be conducted at the end of the semester. For awarding internal marks, the relative weightage of the seminar and the project design will be 1:1.

SEMESTER VIII

08.801 MOBILE COMPUTING

L-T-P: 3 – 1 – 0 **Credits: 4**

MODULE I (17 hours)

Introduction , Wireless Transmission – Frequencies for radio transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread spectrum. Medium Access Control – SDMA, FDMA, TDMA, CDMA, Cellular Wireless Networks. Telecommunication systems – GSM, GPRS, DECT, TETRA, UMTS and IMT-2000 .

MODULE II (17 hours)

Satellite Networks - Basics, Parameters and Configurations, Capacity Allocation – FAMA and DAMA. Broadcast Systems – DAB, DVB. Wireless LAN – IEEE 802.11 - IEEE 802.11a – 802.11b, HIPERLAN – Blue Tooth.

MODULE III (18 hours)

Mobile Network Layer - Mobile IP, Dynamic Host Configuration Protocol, Mobile ad-hoc networks. Introduction to wireless sensor networks. Mobile Transport Layer - Traditional TCP, Classical TCP improvements, TCP over 2.5/3G wireless networks. Support for mobility – File Systems, WWW, WAP, i-mode, SyncML, WAP 2.0.

Text Books:

1. Mobile Communications - Jochen Schiller, Second Edition, Pearson Education
2. Wireless Communications and Networks - William Stallings, Pearson Education

08.802 E-COMMERCE

L-T-P: 3 – 0 – 0 **Credits: 3**

MODULE I (13 hours)

Definition and scope of e-commerce - Advantages and constraints - Strategy making in online environment - Framework for e-commerce.
Basic Technology - Intranets and extranets - Planning an intranet - Extranets and Supply Chain Management - Hosting a web site - Choosing an ISP - Mobile commerce - Website evaluation and usability testing.

MODULE II (13 hours)

Market opportunity analysis - Internet marketing - Tracking customers - Customer service - Web portals and web services - Branding.
Business models in e-commerce - B2C and B2B models - advantages and disadvantages - SCM and B2B - Electronic Data Interchange.

MODULE III (13 hours)

Ethical issues - Legal issues - Copyrights and trademarks - Warranties - Taxation - Online gambling - International issues - Intellectual Property Rights.
Payment systems - Electronic money - Requirements for internet-based payments - Types of electronic payment media - Credit cards - Smart cards - E-cash - E-wallet - Electronic Funds Transfer - B2B and e-payment - M-commerce and e-payment.

Text Books :

1. Electronic Commerce - From Vision to Fulfillment, 3rd Edition, Elias M. Awad, Pearson Education 2008.
2. Introduction to E-commerce, 2nd Edition, Jeffrey F. Rayport and Bernard J. Jaworski, Tata McGraw-Hill Edition, 2008.

08.803 E-SECURITY

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (12 hours)

Security in Computing. Elementary Cryptography. Program Security.

MODULE I (14 hours)

Protection in general purpose Operating Systems.
Designing trusted Operating Systems.
Database Security.

MODULE I (13 hours)

Security in Networks. Administering Security. Legal, Privacy and Ethical issues in Computer security.

Text Book :

Security in Computing - Charles P Pfleeger, Shari Lawrence Pfleeger, Pearson Education.

Reference :

1. Principles of Information Security - Michael E. Whitman, Herbert J. Mattord, Course Technology Cengage Learning 2008.
2. PKI : Implementing and Managing E Security - Andrew Nash, Derek Brink, Bill Duane, McGraw Hill.

08.804 SOFTWARE TESTING

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Characteristics of Software – Software Development process – Software quality Management – Processes related to software quality - Fundamentals of Software Testing – Principles of Software Testing – Structured approach to Testing - Developing Testing methodologies – Levels of Testing – Acceptance Testing – Special Tests – Testing Tools.

MODULE II (13 hours)

Test planning - Test strategy – Test plan templates (System testing) – Guidelines for developing test plan - Test Estimation – Test standards – Building Test data and Test cases - Test Scenario – Test Scripts - Tools used to build test data – testing object oriented software – Testing web applications.

MODULE III (13 hours)

Test metrics and Test reports – categories of the product/project test metrics – Resources consumed in Testing – Effectiveness of testing – defect density – defect leakage ratio – residual defect density – test team efficiency – test case efficiency - test reports Integration test reports – System Test report – acceptance test report - guidelines for writing and using test report - final test reporting – test status report - benchmarking.

Text Books :

1. Software Testing, Principles , Techniques and Tools - M G Limaye, TMHB
2. Introducing Software Testing - Louise Tamres, Pearson

References :

1. Software Testing - Effective methods, Tools and Techniques - Renu Rajani, Pradeep Oak, TMH
2. The Art of Software Testing - Glenford J. Myers, Wiley
3. Software Testing Fundamentals Methods and Metrics -Marnie L Hutcheson, Wiley
4. Effective Software Testing, 50 Specific Ways to Improve Your Testing - Elfriede Dustin Pearson

08.805A ADVANCED MICROPROCESSORS

L-T-P: 4 – 0 – 0 **Credits : 4**

MODULE I (17 hours)

Intel 8085 – Introduction-Addressing modes - Instruction set - CPU pins & associated signals - Interrupt Systems – Assembly Language Programming
Intel 8086 – Architecture - Addressing modes - Instruction set – Input Output – Interrupts – Design - Assembly Language Programming.
The Mechanics of Program Execution.

MODULE II (17 hours)

Pipelined Execution - Superscalar Execution - The Intel Pentium and Pentium Pro - P, PowerPC Processors: 600 Series, 700 Series, and 7400 - Intel's Pentium 4 vs. Motorola's G4e:Approaches and Design Philosophies. Intel's Pentium 4 vs. Motorola's G4e: The Back End.

MODULE III (18 hours)

64-Bit Computing and x86-64 - The G5: IBM's PowerPC 970- Understanding Caching and Performance-Intel's Pentium M, Core Duo, and Core 2 Duo.

Text Books :

1. Inside the Machine, An Illustrated Introduction to Microprocessors and Computer Architecture - Jon Stokes, No Starch Press 2006.

2. Microprocessors Theory & Applications: Intel & Motorola – Revised Edition by M. Rafiquzzaman, PHI.

08.805B NETWORK PROGRAMMING

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (18 hours)

Internet Protocol, The structure of TCP /IP software in an operating system, Network interface layer, Address Recovery and binding global, Software organization, Routing table and Routing algorithm, Fragmentation and reusability of datagrams, Error processing, Multi cast processing.

MODULE II (17 hours)

User datagrams. TCP- Data structures and Input processing. Finite state machine implementation, Output processing timer management, flow control and adaptive retransmission, Urgent data processing and the push function.

MODULE III (17 hours)

Socket level interface, Active Route propagation and Passive acquisition, Route propagation with an SPF algorithm.

Text Books :
Internetworking with TCP / IP - Volume II, Design, Implementation and Internals, D. E. Comer and D. L Stevens, PHI.

08.805C GRAPH THEORY
(Common with 08.805(4) of CSE)

L-T-P: 4-0-0 **Credits: 4**

MODULE I (16 hours)

What is graph – Application of graphs – finite and infinite graphs – Incidence and Degree – Isolated vertex, pendent vertex, Null graph.
Paths and circuits – Isomorphism, sub graphs, walks, paths and circuits, Connected graphs, disconnected graphs, Euler graphs, Hamiltonian paths and circuits – Travelling salesman problem.
Trees – properties, pendent vertex, Distance and centres - Rooted and binary tree, counting trees, spanning trees.

MODULE II(18 hours)

Combinatorial versus geometric graphs, Planar graphs, Different representation of planar graphs, geometric dual, combinatorial dual, vector spaces of graph, ban2 vectors of a graph, orthogonal vectors and spaces Directed graphs – types of digraphs, Digraphs and binary relation, Euler graphs, trees with directed edges.

MODULE III18 hours)

Graph theoretic algorithms and computer programming - Algorithm for computer representation of a graph, algorithm for connectedness and components, spanning tree, directed circuits, shortest path, searching the graphs, Isomorphism.
Graphs in switching and coding theory – contact networks, Analysis of contact Networks, synthesis of contact networks, sequential switching networks, unit cube and its graph, graphs in coding theory.

Text Books :
1. Graph Theory – Frank Harara, Narosa Publishers.
2. Graph Theory – Narasingh Deo, PHI.

Reference Books :
1. Graphs Theory Applications – L.R. Foulds, Narosa Publishers.
2. A First Look at Graph Theory – John Clark and Derek Allan Hotton, Allied.

08.806A SOFT COMPUTING

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (17 hours)

Comparison of Soft Computing Methods -Neural networks, Fuzzy Logic, Genetic Algorithm with Conventional Artificial Intelligence(hard computing) Neural Networks- Different Architectures, Back-propagation Algorithm, Hybrid Learning Rule, Supervised Learning- Perceptrons, Back-propagation Multilayer Perceptrons, Unsupervised Learning – Competitive Learning Network.

MODULE II(18 hours)

Fuzzy Set Theory – Basic Definition and terminology, Basic Concepts of Fuzzy Logic, Set Theoretic Operators, Membership functions- formulation and parameterization. Fuzzy Union, Intersection, and Complement. Fuzzy Rules and Fuzzy Reasoning. Fuzzy Inference Systems- Mamdani and Sugeno Fuzzy models. Fuzzy Assocaitive Memories. Neuro-Fuzzy Modelling.

MODULE III(18 hours)

Genetic Algorithm – Basics of Genetic Algorithms, Design issues in Genetic Algorithm, Genetic Modelling, Hybrid Approach, GA based Fuzzy Model Identification. Fuzzy Logic controlled Genetic Algorithm, Neuro- Genetic Hybrids & Fuzzy – Genetic Hybrids.

Text Book :

Neural Networks, Fuzzy Logic & Genetic Algorithms, S Rajasekharan, S A Vijayalekshmi Pai, PHI 2003.

References :

1. *Neurofuzzy and Soft Computing,* J S R Jang, C T Sun, E Mizutani, PHI.
2. *Neural Networks,* James A Freeman & David M Skapura, Pearson.
3. *Genetic Algorithms,* David E Goldberg, Pearson.
4. *Fuzzy Logic, Intelligence, control, and Information,* John Yen & Reza Langari, Pearson.
5. *Neural Fuzzy Systems,* C T Lin & C S G Lee, PHI.
6. *Fuzzy Engineering,* Bart KoskO, PHI 1997.
7. *Neural networks,* Simon Haykins, PHI / Pearson.

08.806B DISTRIBUTED SYSTEMS

L-T-P: 4 – 0 – 0 **Credits:4**

MODULE I (17 hours)

Characteristics of distributed System: Examples of distributed systems – resource sharing and web – world wide web – issues in the design of distributed system. System models: Architectural models and fundamental models. Networking and internetworking: Types of network – network principles – Internet protocols

MODULE II(17 hours)

Interprocess communication : the API for Internet protocol – external data representation and Marshalling – client server communication - group communication-Case study: inter process communication in Unix. Distributed objects and remote invocation: communication between distributed objects – remote procedure call – Events and notification.

MODULE III(18 hours)

Operating system support: Operating system layer – protection – processes and threads-communication and invocation – Operating system architecture.
Distributed file system: File service architecture – Sun network file system- Transactions and concurrency control: Transactions, nested transactions-locks-optimistic concurrency control.
Replication : System model and group Communication.

Text Books:
Distributed Systems: Concepts and Design – George Coulouris, Jean Dollimore and Tim Kindberg, Pearson Education
References:
1. Distributed Systems: Principles and Paradigms – Andrew S Tanenbaum and Maarten Van Steen, Pearson Education
2. Distributed Systems and Computer Networks – Morris Solomon and Jeff Krammer, PHI

08.806C WEB SERVICES

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (18 hours)

Introduction to web services - Benefits of web services - How web services work. XML schema - Basic elements and attributes - Types - Occurrence constraints - Element groups - Namespaces - Qualification - Global declarations - Modular schemas - Extensions and restrictions - Substitution groups - Importing types.

MODULE II (17 hours)

Simple Object Access Protocol - SOAP messages - SOAP message exchange model - SOAP encoding and XML schemas - SOAP data types - SOAP transports.

MODULE III (17 hours)

Web Services Description Language - Data types and messages - Defining a web service interface - Defining a web service implementation - Message patterns. Universal Directory and Discovery Interface - UDDI registries - UDDI publish interface - UDDI inquiry interface - Using UDDI and WSDL together.

Text Books :

1. .NET Web Services Architecture & Implementation, Keith Ballinger, Pearson Education 2003.
2. C# How to Program, Deitel & Deitel, Pearson Education 2002.
3. XML in Action : Web Technology, Pardi, PHI 2002.
4. Web Services - An Introduction, B.V. Kumar, S.V. Subrahmanya, Tata McGraw Hill 2009.

08.807 WEB APPLICATIONS LAB

L-T-P: 0 – 0 – 4 **Credits: 4**

1. Implementing and deploying web applications using Servlets, HTML and JSPs.
2. Testing the application on an Application Server.
3. Debugging Web applications locally and remotely.
4. Developing applications in a team environment.
5. Retrieval of data from database using SQL and exchange of information in XML format.

08.808 PROJECT & VIVA VOCE

L-T-P: 0 – 0 – 4 **Credits: 4**

The project should be based on the core subjects of the discipline. The work can be carried out in the department under the supervision of a faculty member or with the help of an external organization. In the latter case, the motivation of the organizations should be purely academic and they should provide an external guide whose qualifications should be on par with that of a faculty member. An internal guide will be consistently interacting with the external guide and monitoring the progress of the project. There should be a mid-semester and end-semester evaluation of the project.

The student has to submit a thesis in the prescribed format, duly certified by the internal guide and external guide(if any).

In the viva voce, the student's performance will be evaluated based on the project work, the seminar presented and the knowledge of the courses in the whole curriculum. The distribution of the marks will be in the ratio 2:1:2, respectively.