UNIVERSITY OF KERALA

B. TECH. DEGREE COURSE

2008 ADMISSION

REGULATIONS

and

I – VIII SEMESTERS
SCHEME AND SYLLABUS

of

COMPUTER SCIENCE AND ENGINEERING

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 an 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.

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

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.

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

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

UNIVERSITY OF KERALA

SCHEME OF STUDIES AND SYLLABUS 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 I	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,

08.101 ENGINEERING MATHEMATICS I

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

MODULE I

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*.

08.103 ENGINEERING CHEMISTRY

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

MODULE I

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: 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.

SECTIONS 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

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.*

UNIVERSITY OF KERALA

SCHEME OF STUDIES AND SYLLABUS FOR B. TECH DEGREE

2008 ADMISSION

III – VIII SEMESTERS

COMPUTER SCIENCE AND 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	Computer Hardware Design	2	1	0	50	3	100	3
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	Operating Systems	3	1	0	50	3	100	4
08.407	Data Structures Lab (R F)	0	0	4	50	3	100	4
08.408	Digital System Lab	0	0	4	50	3	100	4
	Total	**15**	**6**	**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 (E R F B H)	3	1	0	50	3	100	4
08.502	Advanced Mathematics and Queuing Models (R F)	3	1	0	50	3	100	4
08.503	Data Base Design	2	1	0	50	3	100	3
08.504	Systems Programming (R F)	2	1	0	50	3	100	3
08.505	Microprocessors and Interfacing	2	2	0	50	3	100	4
08.506	Object Oriented Design and JAVA Programming	2	1	0	50	3	100	3
08.507	Object Oriented Programming Lab	0	0	4	50	3	100	4
08.508	Application Software Development Lab	0	0	4	50	3	100	4
	Total	**14**	**7**	**8**	**400**		**800**	**29**
	Total	**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 (R F)	3	1	0	50	3	100	4
08.602	Principles of Programming Languages	2	1	0	50	3	100	3
08.603	Formal Languages and Automata Theory	3	1	0	50	3	100	4
08.604	Digital Signal Processing	2	1	0	50	3	100	3
08.605	High Performance Microprocessors	3	1	0	50	3	100	4
08.606	Data Communication	2	1	0	50	3	100	3
08.607	Microprocessor Lab	0	0	4	50	3	100	4
08.608	System Software Lab	0	0	4	50	3	100	4
	Total	**15**	**6**	**8**	**400**		**800**	**29**
	Total	**1200**						

Semester VII		Hours / Week			Maximum Sessional Marks	University Exams		Credits
Course Code	Subject	L	T	D/P		Hours	Maximum Marks	
08.701	Computer Graphics	2	1	0	50	3	100	3
08.702	Design and Analysis of Algorithms	2	1	0	50	3	100	3
08.703	Computer Networks	2	1	0	50	3	100	3
08.704	Elective I	3	1	0	50	3	100	4
08.705	Elective II	3	1	0	50	3	100	4
08.706	Computer Hardware and Interfacing Lab	0	0	4	50	3	100	4
08.707	Operating Systems and Network Programming Lab	0	0	4	50	3	100	4
08.708	Project Design and Seminar	0	0	4	100	-	-	4
	Total	**12**	**5**	**12**	**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	Software Engineering and Project Management	2	1	0	50	3	100	3
08.802	Computer System Architecture	3	1	0	50	3	100	4
08.803	Cryptography and Networks Security	2	1	0	50	3	100	3
08.804	Distributed Systems	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	Algorithm Design Lab	0	0	4	50	3	100	4
08.808	Project Work and Viva Voce	0	0	4	100	-	100	4
	Total	**15**	**6**	**8**	**450**		**800**	**29**
	Total Marks	**1250**						

08.704 Elective I	
1	Computational Geometry
2	Multimedia Systems and Data Compression
3	Communicative English and Technical Writing **(Common with F 08.705D)**
4	Pattern Recognition and Scene Analysis
5	Control Systems Engineering

08.705 Elective II	
1	Advanced Data Base Management System
2	Computer Hardware and Interfacing
3	Neural Computing
4	Data Mining Techniques **(Common with F 08.706C)**
5	C# and .NET Framework

08.805 Elective III	
1	Fuzzy Set Theory and Applications
2	Software Architecture
3	Mobile and Wireless Networks
4	Graph Theory **(Common with F 08.805C)**
5	Soft Computing

08.806 Elective IV	
1	Artificial Intelligence
2	Digital Image Processing
3	Embedded Systems
4	Internet Technology
5	Bioinformatics

08.301 ENGINEERING MATHEMATICS II 3 – 1 – 0
(C M P U N E R F T A H B)

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

Internal Continuous Assessment *(Maximum Marks-50)*

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 A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.302 PROBLEM SOLVING AND PROGRAMMING IN C (R F) 2 – 2 – 0

Module I (15 hours)

Introduction to digital computer – VonNewman 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.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.303 DISCRETE STRUCTURES (R F) 2 – 1 – 0

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, TMH
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.

Internal Continuous Assessment *(Maximum Marks-50)*

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 A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	

Maximum Total Marks: 100

08.304 ELECTRONIC CIRCUITS (R F) 2 – 1 – 0

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

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	

Maximum Total Marks: 100

08.305 DIGITAL SYSTEM DESIGN (R F) 2 – 2 – 0

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.

Internal Continuous Assessment *(Maximum Marks-50)*

25 Marks - Tests (minimum 2)

15 Marks - Assignments (minimum 3) such as home work, problem solving, literature survey, seminar, term-project, hardware/PC interface exercises, simulation exercises using technical computing software etc.

10 Marks - Regularity in the class

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.306 COMPUTER ORGANIZATION (R F) 2 – 1 – 0

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.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.307 ELECTRONIC CIRCUITS LAB (R F) 0 – 0 – 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.

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term projects, assignment-hardware exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce.
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:
- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

03.308 PROGRAMMING LAB (R F) 0 – 0 – 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 exercises may include the following:-

Programs using –

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

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term projects, assignment - programming exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:
- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

08.401 ENGINEERING MATHEMATICS III 3 – 1 – 0
(C M P U N E R F H B)

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 $w = 1/z$, $w = z^2$, $w = z + 1/z$, $w = \sin z$, $w = \cos z$, 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 – $\int_0^{2\pi} f(\sin\theta, \cos\theta)\, d\theta$, $\int_{-\infty}^{\infty} f(x)\, dx$ 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

Internal Continuous Assessment *(Maximum Marks-50)*

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 A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.402 HUMANITIES 3 – 0 – 0
(C R F T A H B)

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

1. Double Entry Book-Keeping – Batliboi
2. A systematic Approach to Accounting – K.G.Chandrasekharan Nair.

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 COMPUTER HARDWARE DESIGN 2 – 1 – 0

Module I (13 hours)

Arithmetic algorithms: Algorithms for addition and subtraction of binary and BCD number – algorithms for multiplication and division of binary and BCD numbers – array multiplier – booth's multiplication algorithm – restoring and nonrestoring division – algorithms for floating point addition, subtraction, multiplication and division.

Module II (13 hours)

Processor Logic Design: Register transfer logic – interregister transfer – arithmetic, logic and shift microoperations – conditional control statements – processor organization – design of arithmetic unit, logic unit, arithmetic logic unit and shifter – status register – processor unit – design of accumulator.

Module III (13 hours)

Control Logic Design: Control organization – design of hardwired control – control of processor unit – PLA control – microprogrammed control – microinstructions – horizontal and vertical micro instructions – nanomemory and nanoinstructions – microprogram sequencer – microprogrammed CPU organization.

Text Books:

1. Digital Logic and Computer Design – M. Morris Mano, PHI.
2. Computer System Architecture – M. Morris Mano, PHI.
3. Computer Organization and Design – P. Pal Chaudhuri, PHI.

Reference Books:

1. Computer Organization and Architecture – W. Stallings, Prentice Hall.
2. Computer Architecture and Organization – H.P. Hayes, McGraw Hill.
3. Switching and finite Automata Theory – ZVI Kohavi, TMH Edition.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	
		Maximum Total Marks: 100

08.404 OBJECT ORIENTED TECHNIQUES (R F) 2 – 1 – 0

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)

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	

Maximum Total Marks: 100

08.405 DATA STRUCTURES AND ALGORITHMS (R F) 2– 2 – 0

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 dqueues.

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 – Tremblay and Sorensons, TMH.
2. Fundamentals of data structures – Horowitz and 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)

Internal Continuous Assessment *(Maximum Marks-50)*

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 A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.406 OPERATING SYSTEMS 3 – 1 – 0

Module I (15 hours)

Introduction : Basic concepts – terminology. Historical perspective - early system - simple monitor - performance - types of OS - batch processing - multiprogramming - time sharing - real time system - different classes of computers - functions and components of an operating system - OS structure - Multiprocessor system - distributed system. Operating system services. ***Information management:*** File concepts file support - file system - directory structure - gaining access to files - basic file system calls - sharing and security - operation on files - file protection - allocation methods - implementation issues - case study.

Module II (18 hours)

Processor management : CPU scheduling - Review of Multiprogramming concepts - scheduling concepts - scheduling algorithm - Multiprocessor scheduling , Concurrent process. Critical section problem - Semaphores - process coordination - determinant program Modularization - Synchronization. ***Memory management :*** Preliminaries - Memory architecture evolution - Resident monitor - Swapping - fixed partitions - variable partitions - paging - segmentation - combined system - virtual memory concepts - overlay - demand paging - page replacement - space allocation policies - segmented paging - dynamic linking - caching of secondary storage information.

Module III (19 hours)

Device management : Physical characteristics – FCFS, SSF, C–SCAN - selecting a disk scheduling algorithm - sector queuing. I/O scheduling policies - terminal I/O handling - channels and control units - virtual devices. ***Dead locks :*** Dead lock problem - characteristics - prevention - avoidance - detection - Recovery from dead lock - combined approach to dead lock handling. ***Protection :*** Goals of protection - Mechanisms and policies - domain of protection - access matrix and its implementation. Dynamic protection structures, Language based protection - security.

Text Books:

1. Operating system concepts – J.L. Peterson and A. Silberschats, Addison Wesley.
2. An introduction to operating systems concepts and practice – P.C.P. Bhatt, PHI.
3. Operating systems – S. Madnick and J.J. Donovan, McGraw Hill Int. student edition, Kogokuzha, Tokyo.

Reference Books:

1. Operating System Principle – P. Brinch Hanson, Prentice Hall of India.
2. The Logical design of operating systems – A.C. Shaw, Prentice Hall
3. Operating system principles – H.M. Deite, Addison-Wesley

Internal Continuous Assessment *(Maximum Marks-50)*

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 A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.407 DATA STRUCTURES LAB (R F) 0 – 0 – 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, Dqueues, 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

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term projects, assignment-programming exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce.
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:
- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

08.408 DIGITAL SYSTEM LAB 0 – 0 – 4

1. Realization of Logic Circuits using basic gates.
2. Arithmetic circuits – Half adder, Full Adder circuits using gates
3. Flip-Flops and Latches – RS, D, T, JK and master-slave using gates.
4. Shift Registers, ring counters, and Johnson counter using gates and ICs
5. Modulo-N ripple counters and synchronous counters using flip-flops.
6. Counter ICs, Sequence generator.
7. Four bit magnitude comparator, 4 bit Adder/Subtractor, BCD Adder using ICs.
8. BCD to Decimal and BCD to 7 segment decoder & display.
9. Multiplexers/ Demultiplexers using gates and ICs.
10. Realization of cobinational circuits using multiplexer/demultiplexer ICs
11. Astable and monostable multivibrators using gates and ICs.
12. Study of ROM, RAM.

Optional experiments *(to help the students to enhance their knowledge in the subject – can be carried out at the discretion of the institute, not compulsory).*

1. – Introduction to VHDL and simulation of 2/3 simple experiments from the above list using VHDL
2. – Introduction to PC interface and implement an interface experiment with gates – AND, OR, NAND, NOR. It involves programming (preferably in C) to provide control signals from the parallel port to the inputs of the logic gates. The output of the gate will be displayed with an LED.

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, circuit design capability, keeping track of rough record and fair record, term projects, assignment-hardware/simulation exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce.
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:

- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

08.501 ENGINEERING MATHEMATICS IV 3 – 1 – 0
(E R F B H)

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

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.502 ADVANCED MATHEMATICS AND QUEUING MODELS (R F) 3 – 1 – 0

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 theorem 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 - $P_n=\rho^nP_0$ (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,

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.503 DATA BASE DESIGN 2 – 1 – 0

Module I (14 hours)

Introduction to database- traditional file system- data and need for information- sequential, random and indexed sequential files- data organization- single and multilevel indexes- B trees and B+ trees- secondary storage devices- database approach–data models- schemas and instances- Data independence – 3 schema architecture – Data base languages – Data base users – Classification of data base systems – E-R modelling– Attributes and keys – E-R diagrams – Weak entities – extended E-R model- mapping ER model to relational model

Module II (14 hours)

Introduction to Relational model: Basic concepts: Domains Attributes, keys, tuples, relations – Relational data base schemas – relational Algebra operations, SQL in queries – views- Over view of relational calculus- Conceptual design of relational data base – Normalization theory- Functional dependencies- membership and minimal covers- Loss less decomposition of relations- First, Second, Third and Boyce – Cod normal forms – Multi valued dependencies and Fourth normal form – Join dependencies and Fifth normal form.

Module III (11 hours)

Security issues in database- transaction management - properties of transactions- database architecture- concurrency control- serializability (preliminary treatment only) – locking methods - time stamping methods - database recovery.

Text Books:

1. Fundamentals of Database Systems – Ramez Elmasri and Shakant B. Navathe, Pearson Education.
2. Database System Concepts – Henry F. Korth and Abraham Silbershatz, McGraw Hill
3. Database systems, 3rd Edn – Thomas Connolly and Carolyn Begg, Pearson Education

Reference Books:

2. Database management systems - Alexis Leon and Mathews Leon, Vikas publishing
3. Principles of Database Systems - Jeffry D. Ullman, Galgotia Publications.
4. Introduction to database Management – M.L. Gillenson et al., Wiley
5. Fundamentals of Database Management Systems – M.L. Gillenson, Wiley

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	

Maximum Total Marks: 100

08.504 SYSTEMS PROGRAMMING (R F) 2 – 1 – 0

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 features, 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 – Damdhare, Tata McGraw Hill.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	
		Maximum Total Marks: 100

08.505 MICROPROCESSORS AND INTERFACING 2 – 2 – 0

Module I (16 hours)

Intel 8085 Microprocessor – Internal Architecture, Addressing modes. Timing – 8085 bus activities during a read/write machine cycle. Addressing memory and ports, ROM/RAM/Port decoder. A/D and D/A converters and interfacing.

Module II (18 hours)

Intel 8086 Microprocessor – Internal architecture, Signals and System connections, addressing modes, Minimum mode and Maximum mode- system timing, Comparison with 8088, Instruction set and programming. Assembler directives, Interrupts and interrupt applications, 8259A Priority Interrupt controller.

Module III (18 hours)

Interfacing 8086- 8254 software programmable timer/counter, 8237 DMA controller, Digital interfacing – 8255 Programmable Peripheral Interface, display and key board interfacing with 8279, 8251A USART.

Text Books:

1. Interfacing & applications of Microprocessors – Gaonkar, Prentice Hall
2. Microprocessors and Interfacing – Douglas V. Hall, McGraw Hill.

Reference Books:

1. Microprocessors, PC Hardware and Interfacing – N Mathivanan, PHI Learning Pvt. Ltd.
2. Microprocessors and programmed logic – Kenneth L. Short, Pearson Education.
3. Microprocessor, Microcomputer and Applications, 3rd Edn – A. K. Mukopadhyaya, Narosa.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	
		Maximum Total Marks: 100

08.506 OBJECT ORIENTED DESIGN AND JAVA PROGRAMMING 2 – 1 – 0

Module I (15 hours)

Review of Object Oriented Concepts – Object Oriented Systems Development Life cycle- Object Oriented Methodologies – Rumbaugh Methodology – Booch Methodology – Jacobson et. al methodology – Patterns - Frameworks – Unified Approach - Unified Modeling Language – Static and Dynamic Models – UML diagrams – UML Class Diagram – Use-Case Diagram – UML Dynamic Modeling - Sequence Diagrams - UML Meta-Model - Object Oriented Analysis Process – Identifying Use Cases – Identifying Object Relationships, Attributes and Methods – Designing classes

Module II (11 hours)

Java Overview – Java Virtual Machine – Introduction to Java Programming – Operators and Expressions – Control Flow statements – Defining classes and creating objects in Java – Constructors – Access Modifiers – Programs using Java objects - Inheritance – Abstract classes – Access Modifiers - final class – final method - Method overriding – Polymorphism - Packages in Java – String Handling - Exception Handling - Parameter Passing - Java.io.package classes – Input/Output Streams – Reading console input – Collection framework – Accessing Collection via Iterator interface – Utility Classes in Java

Module III (13 hours)

Threads in Java – Thread class and Runnable interface – Thread Synchronization - Applets – Applet basics - lifecycle – Introduction to AWT- SWING overview – Creating simple GUI applications using SWING - Reflection in Java - Reading Type Information - Methods - Java database Connectivity – JDBC overview – JDBC Driver types – Loading Driver class – Obtaining Connection to database – Statement – Prepared Statement –Executing queries.

Text Books:

1. Object Oriented Systems Development using the Unified Modeling Language – Ali Bahrami, McGraw-Hill Int.
2. Java: The Complete Reference J2SE 5th Edn – Herbert Schildt, TMH.

Reference Books:

1. Object Oriented Design with UML and Java – K. Barclay, J. Savage, Elsevier Publishers
2. Object Oriented Analysis and Design with Apllications, 2nd Edn – Grady Booch, Pearson Education
3. Object Oriented Modeling and Design with UML, 2nd Edn – Blaha, Rumbaugh, Pearson Education
4. Head First Java, 2nd Edn – Kathy Sierra, O'Reilly
5. Programming JAVA a Primer – E. Balagurusamy, TMH

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	

Maximum Total Marks: 100

08.507 OBJECT ORIENTED PROGRAMMING LAB 0 – 0 – 4

Programming exercises based on the courses ***08.404 Object Oriented Techniques.*** The exercises may include the following:-

1. Programs Using Functions
   - Functions with default arguments
   - Implementation of Call by Value, Call by Address and Call by Reference
2. Simple Classes for understanding objects, member functions and Constructors
   - Classes with primitive data members
   - Classes with arrays as data members
   - Classes with pointers as data members – String Class
   - Classes with constant data members
   - Classes with static member functions
3. Compile time Polymorphism
   - Operator Overloading including Unary and Binary Operators.
   - Function Overloading
4. Runtime Polymorphism
   - Inheritance
   - Virtual functions
   - Virtual Base Classes
   - Templates
5. File Handling
   - Sequential access
   - Random access

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term projects etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce.
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:
- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

08.508 APPLICATION SOFTWARE DEVELOPMENT LAB 0 – 0 – 4

Programming exercises based on the courses ***08.503 Data Base Design*** and ***08.506 Object Oriented Design and JAVA Programming*** will be covered in this subject. The exercises may include the following so that the students get trained in (i) Practicing database commands (ii) Developing GUI based application using database.

1. Familiarization of creation of databases, SQL commands (DDL, DML & DCL) and group functions to access data from the database. Suitable exercises to practice SQL commands in the above category may be given.

2. Write SQL procedure for an application using exception handling.

3. Write SQL procedure for an application using cursors.

4. Write a DBMS program to prepare reports for an application using function.

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.

A report containing analysis and design for the above database application should be included in the laboratory record immediately after the write up for the programming exercises 1 through 5. The principles learned from ***08.506 Object Oriented Design and JAVA Programming*** may be used for creating the above report. To prepare the report, the students may follow the guidelines given in **APPENDIX (R)**.

Optional Exercises:

A web based database application may be given as an additional exercise in any of the relevant domain.

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term projects, assignment-software/hardware exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

A complete GUI based database application incorporating one/more features listed in the exercises above will be used to test the students' knowledge in the topic. Students have to demonstrate the database application softwares developed by them (the 6th exercise) as part of the viva voce.

Marks should be awarded as follows:

30 Marks - Viva voce (30% weightage should be given to Exercise No. 6).
45 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:

- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

08.601 COMPILER DESIGN (R F) 3 – 1 – 0

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, 2nd Edn – A.V. Aho, M.S. Lam, R. Sethi, J.D. Ullman, Pearson Education
2. Compiler Design – Santanu Chattopadyaya, PHI

Reference Books

1. Engineering a Compiler, 2nd Edn – Keith D Cooper and Linda Torczon, Elsevier
2. Modern Compiler Implementation in C – Andrew W. Appel, Cambridge University Press.
3. Compiler Construction : Principles and Practice – Kenneth C. Louden, Cengage Learning
4. Algorithms for Compiler Design – O.G. Kakde, Cengage Charles River Media
5. Principles of Compiler design – V. Raghavan, TMH

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.602 PRINCIPLES OF PROGRAMMING LANGUAGES 2 – 1 – 0

Module I (13 hours)

Names, Scopes, and Bindings:- Names and Scopes, Binding Time, Scope Rules, Storage Management, Aliases, Overloading, Polymorphism, Binding of Referencing Environments.

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 (13 hours)

Subroutines and Control Abstraction: - Static and Dynamic Links, Calling Sequences, Parameter Passing, Generic Subroutines and Modules, Exception Handling, Coroutines.

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.

Module III (13 hours)

Innovative features of Scripting Languages:- Scoping rules, String and Pattern Manipulation, Data Types, Object Orientation.

Concurrency:- Threads, Synchronization, Language-Level Mechanisms.

Run-time program Management:- Virtual Machines, Late Binding of Machine Code, Reflection, Symbolic Debugging, Performance Analysis.

Text Books:

1. Programming Language Pragmatics, 3rd Edn – M.L. Scott, Morgan Kaufmann Publishers
2. Programming Languages: Principles and Practice, 2nd Edn – Kenneth C. Louden, Cengage Learning

Reference Books:

1. Programming Languages: Principles and Paradigms, 2nd Edn – A.B. Tucker and R.E. Noonan, TMH
2. Concepts of Programming Languages, 8th Edn – R.W. Sebesta, Pearson Education.
3. Programming Languages: Concepts & constructs, 2nd Edn – Ravi Sethi, Pearson Education
4. Programming Language Design Concepts – David A. Watt, Wiley Dreamtech
5. Programming Languages: Design and Implementation, 4th Edn – T.W. Pratt, M.V. Zelkowitz, and T.V. Gopal, Pearson Education
6. Programming Language Concepts, 3rd Edn – C. Ghezzi and M. Jazayeri, Wiley

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module	

Maximum Total Marks: 100

08.603 FORMAL LANGUAGES AND AUTOMATA THEORY 3 – 1 – 0

Module I (18 hours)

Introduction to theory of computation, Finite state automata – description of finite automata, Properties of transition functions, Designing finite automata, NFA, 2 way finite automata, equivalence of NFA and DFA, Mealy and Moor machine, finite automata with epsilon moves, Regular sets and regular grammars, regular expressions, pumping lemma for regular languages, closure properties of regular sets and regular grammars, Application of finite automata, Decision algorithms for regular sets, Minimization of FSA**.**

Module II (16 hours)

Chomsky classification of languages, CFGs, 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, equivalence with CFGs, PDA and CFG, Chomsky hierarchy.

Module III (18 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.

Text Books:

1. Introduction to automata theory, languages and computation – J.E. Hopcroft , R. Motwani and J.D. Ullman, Addison Wesley

Reference Books:

1. Introduction to the Theory of Computation, 2nd Edn – Michael Sipser, Thomson Publishing
2. Mathematical theory of computation – Manna, McGraw Hill
3. Introduction to automata theory and formal languages – Peter Linz, Narosa Publishing
4. Switching and Finite automata theory – Kohavi, Tata McGraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module	
		Maximum Total Marks: 100

08.604 DIGITAL SIGNAL PROCESSING 2 – 1 – 0

Module I (13 hours)

Signals and systems – introduction – basic operations on signals – continuous time and discrete time signals – step, impulse, ramp, exponential and sinusoidal functions. Continuous time and discrete time systems – properties of systems – linearity, causality, time invariance, memory, stability, invertibility. Linear time invariant systems – convolution.

Module II (13 hours)

Z-transform – region of convergence – properties of Z-transform – inverse Z-transform. Fourier transform (FT) of discrete time signals – properties of FT – relation between Z-transform and FT. Discrete Fourier transform (DFT) - Properties of DFT – inverse DFT - Fast Fourier transform (FFT) - Radix-2 FFT algorithms – butterfly structure.

Module III (13 hours)

Digital filter structures – block diagram and signal flow graph representation – structures for IIR – direct form structure – Cascade form structure – parallel form structure – lattice structure. Structures for FIR – direct form structures – direct form structure of linear phase system – cascade form structure – frequency sampling structure – lattice structure.

Text Books:

1. Introduction to Signals and Systems and Digital Signal Processing – M.N. Bandyopadhyaya, PHI
2. Digital Signal Processing – S.D. Apte, Wiley India
3. Digital Signal Processing, Fundamentals and Applications – Li Tan, Elsevier

Reference Books:

1. Digital Signal Processing – M.H. Hayes,Tata Mc GrawHill (SCHAUM'S OUTlines)
2. Digital Signal Processing – A.V. Oppenheim and R.W. Schafer, Prentice-Hall Inc
3. Digital Signal Processing : A Modern Introduction – A.Ambardar, Thomson India Edition
4. Introduction to Digital Signal Processing – J.K. Proakis and D.G. Manolakis, MacMillan
5. Digital Signal Processing – S.K. Mitra, Wiley
6. Digital Signal Processing : A Practical Guide for Engineers and Scientists – S.W.Smith, Elsevier India
7. Digital Signal Processing – P. Ramesh Babu, Scitech Publications
8. Digital Signal Processing : Theory and Lab Practice – D. Ganesh Rao and V.P.Gejji, Sanguine Publishers.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	

Maximum Total Marks: 100

08.605 HIGH PERFORMANCE MICROPROCESSORS 3 – 1 – 0

Module I (18 hours)

Intel 80286,80386 and 80486 microprocessors- System architecture, Modes- Real mode- Protected mode - Virtual 8086 mode, Segmentation and Paging, Protection schemes, Management of task, Enhanced instructions, Intel Pentium processor –System architecture-Branch prediction-Pentium memory management, Pentium Pro –Architecture and Special features, Pentium 4- Architecture-memory system-Hyper Threading Technology.

Module II (16 hours)

Reduced Instruction Set Computers (RISC)- Instruction execution characteristics, The use of a large register file, Compiler based Register optimization, Reduced Instruction Set Architecture, RISC Pipelining, MIPS R4000, SPARC, The ARM processors- ARM registers- ARM instructions- Memory access instructions and addressing modes, register move instructions, arithmetic and logic instructions and branch instructions (Programming not required) , CISC vs RISC.

Module III (18 hours)

8051 Micro controller hardware- I/O pins, ports and circuits- External memory- Counters and Timers- Serial Data I/O- Interrupts. 8051 instruction set- Addressing modes- Assembly language programming- I/O port programming- Timer and counter programming- Serial communication- Interrupt programming- 8051 interfacing to LCD, Sensors and Keyboard.

Text Books:

1. Advanced Microprocessors and Peripherals, 2nd Edn – A.K. Ray, K.M. Bhurchandi**,** Tat McGraw Hill (Module I & III)
2. Computer Organization and Architecture designing for performance, 7th Ed – William Stalling, Pearson Education (Module II)
3. Computer Organization, 5th Edn – C.Hamacher, Z. Vranesic, S. Zaky, Mc Graw Hill (Module II- ARM Processors)
4. The 8051 Microcontroller Archetecture Programming and Application, 2nd Edn – Kennath J Ayala, Penram International Publishers (India) (Module III)
5. The 8051 Microcontroller and Embedded Systems – Mohammed Ali Mazidi and Jancie Gillispie Mazidi, Pearson Education Asia (Module III)

Reference Books:

1. Microprocessors and Interfacing – Douglas V Hal, McGraw Hill.
2. The Intel Microprocessors 8086/88, 80286,80386,80486,Pentium ,Pentium Pro, PentiumII, PentiumIII, Pentium 4 Archetecture,Programming and interfacing – Barry.B.Brey, PHI.
3. Microprocessors and Microcontrollers : Architecture, Programming and System Design 8085, 8086, 8051, 8096 – K. Kant, PHI.
4. Microprocessor, Microcomputer and Applications, 3rd Edn – A. K. Mukopadhyaya, Narosa.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions*** All questions are compulsory. There should be at least three questions from each module and not more than four questions from any 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*

Maximum Total Marks: 100

08.606 DATA COMMUNICATION 2 – 1 – 0

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, 8th Edn – William Stallings, PHI
2. Data Communications and Networking, 4th Ed – Behrouz A Forouzan, Tata McGraw Hill

Reference Books:

1. Computer Networks, 4th Edn – Andrew S Tanenbaum, PHI
2. Mobile communications, 2nd Edn – Jochen Schiller, Pearson Education

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.607 MICROPROCESSOR LAB 0 – 0 – 4

1. Study of 8086 trainer kit by executing simple programs such as code conversion, decimal arithmetic and bit manipulation
2. Study of Assembler and Debugging commands
3. Programming with 8086 – Addition of 32 bit numbers, matrix multiplication, factorial, LCM, GCD, Fibonacci, String manipulation, search, find and replace, copy operations, sorting.
   (PC Required)
5. Interfacing 8086 with the following and conduct experiments:
   - 8255, 8279, 8259, and 8253/54.
   - Stepper Motor
   - ADC and DAC.
6. Parallel Communication between two Microprocessor Kits using Mode 1 and Mode 2 of 8255.
7. Interfacing Microprocessor kit with PC using RS 232

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term projects, hardware exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:
- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

03.608 SYSTEM SOFTWARE LAB 0 – 0 – 4

The exercises may include the following:

1. Design of a single pass assembler for a hypothetical Machine
2. Design of a 2 – pass assembler for a hypothetical machine
3. Design of assembler which generates code with relocation option
4. Design of absolute loader
5. Design of relocating loader
6. Design of macro processor
7. Lexical analysis
8. Operator precedence relations
9. Recursive descent parser
10. First and follow
11. Intermediate code generation
12. Code generation

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, circuit design capability, keeping track of rough record and fair record, term projects, software exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce.
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:

- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

08.701 COMPUTER GRAPHICS 2 – 1 – 0

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 line 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.

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. McGraw Hill
3. Pattern Recognition and Image Analysis – E. Gose, R. Johnsonbaugh, S. Jost., PHI (Module III – Image Processing part)

Reference Books

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

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.702 DESIGN AND ANALYSIS OF ALGORITHMS 2 – 1 – 0

Module I (12 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, randomised version of quick sort.

Module II (13 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 (14 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 Company

Reference Books:

1. The Design and Analysis of Computer Algorithms – A.V Aho, J.E. Hopcroft and J.D. Ullman, Addison Wesley
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, Addison Wesley
4. Data Structures and Algorithms – A.V. Aho, J.E. Hopcroft and J.D. Ullman, Addison Wesley
5. Foundations of algorithms using C++ Pseudo code, 3rd Edn – R. Neapolitan and K. Naimipour, Narosa.
6. Beginning Algorithms – S. Harris and J. Ross, Wiley

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.703 COMPUTER NETWORKS 2 – 1 – 0

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, IEEE 802.3, 802.4, 802.5. Bridges - Switches - High Speed LANs - Gigabit Ethernet. Wireless LANs - 802.11 a/b/g/n, 802.15.

Network layer – Routing – Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, RIP, OSPF, Routing for mobile hosts. Congestion control algorithms – QoS.

Module III (14 hours)

Internetworking – Network layer in internet. IP Addressing – Classless and Classful Addressing. Subnetting, Internet Control Protocols – ICMP, ARP, RARP, BOOTP. Internet Multicasting – IGMP, Exterior Routing Protocols – BGP . IPv6 – Addressing – Issues .

Transport Layer – TCP & UDP.

Application layer –DNS, Electronic mail, MIME, SNMP. Introduction to World Wide Web.

VoIP - H.323, SIP standards, Gatekeeper.

Text Books:

1. Computer Networks, 4th Edn – Andrew S Tanenbaum, PHI.
2. Data Communications and Networking, 4th Edn – Behrouz A Forouzan, Tata McGraw Hill

Reference Books:

1. Data and Computer Communications , 8th Edn. – William Stallings, PHI.
2. Hand book of Computer Communications Standards, Vol 1 – Willman Stallings, PHI.
3. An Engineering Approach to Computer Networks – Keshav, Addison Wesley.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	
		Maximum Total Marks: 100

08.704 (1) COMPUTATIONAL GEOMETRY (ELECTIVE I) 3 – 1 – 0

Module I (17 hours)

Geometric Preliminaries, DCEL (Doubly Connected Edge List) data structure, Geometric Duality, Geometric Searching - Planar Straight Line Graph (PSLG), Point Location Problem, Location of a point in a planar subdivision, Plane Sweep Algorithm, Slab method, Chain method, Regularization of PSLG, Range Searching Problems.

Module II (17 hours)

Convex Hulls- Convex Hull Algorithms in the Plane -Graham's Scan Algorithm, Jarvi's March, Divide and Conquer Algorithm, Dynamic Convex Hull Algorithm.

Triangulation—Triangulation of a point set, Triangulation Algorithms, Polygon Triangulation, Convexity, Helly's theorem, Delauny Triangulation, Voronoi Diagrams- Applications in the plane , Post Office Problem.

Module III (18 hours)

Arrangements of Lines - Zone Theorem, Many Faces in arrangements, Constructing the arrangements, Forbidden graph theorem, Bipartite graph for many face problems.
Linear Programming - Linear Programming in Two Dimensions, Prune - Eliminate Redundant Half-Planes.
Introduction to Visibility Problems - Definition of direct visibility, Point visibility and Edge visibility, Algorithm for computing point-visible region inside a polygon.

Text Books:

1. Computational Geometry an Introduction – Franco P. Preparata and Michael Ian Shamos, Texts and Monographs in Computer Science, Springer Verlag
2. Algorithms in Combinatorial Geometry – Herbert Edelsbrunner, EATCS Monographs on theoretical computer science, Springer Verlag.
3. Art Gallery Theorems – Joseph O' Rourke, Oxford Press.

Reference Books:

1. Computational Geometry and Computer Graphics in *C++* – Michael J. Laszlo, Prentice Hall of India.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.704 (2) MULTIMEDIA SYSTEMS AND DATA COMPRESSION (ELECTIVE I) 3 – 1 – 0

Module I (17 hours)

Basic Concepts of Multimedia Systems, Applications of Multimedia Systems, Media Types, Architecture of Multimedia System, Types of Multimedia Systems- Stand alone multimedia system, workstation peers, Client Server Configuration. Multimedia Database Management Systems, Multimedia-specific Properties of an MMDBMS, Data Modelling in MMDBMSs.

Module II (17 hours)

Introduction to Compression techniques - Lossless Compression, Lossy Compression. Entropy coding, Source Encoding. Text Compression – Static Huffman coding, Arithmetic Coding, LZ Coding, LZW Coding. Image Compression- JPEG. Audio Compression- Differential Pulse code modulation (DPCM), Adaptive DPCM, MPEG audio coders, Dolby audio coders.

Module III (18 hours)

Video Compression- Video Compression Principle, frame types, Motion estimation and compensation, MPEG-1, MPEG-2, MPEG-4, MPEG-7. Multimedia Synchronization- Intra Object Synchronization, Inter-object Synchronization, Reference Model for Multimedia – Synchronization.

Text Books:

1. Multimedia Communications – Fred Halsall, Pearson Education
2. Multimedia: Computing, Communications and Applications – Ralf Steinmetz and Klara Nahrstedt, Pearson Education.
3. Introduction to Data Compression, Second Edition – Khalid Sayood, Morgan Kaufmann Publishers

Reference Books:

1. Networked Multimedia Systems – S.V Raghavan and Satish. K. Tripati, Prentice Hall of India
2. Multimedia Systems Design – Prabhat K. Anadleigh and Kiran Thakrar, Prentice Hall of India.
3. Principles of Multimedia – R. Parekh, TMH.
4. Multimedia : System, Technology and Communication – S. Pandey and M. Pandey, Katharia and Sons publishing

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.704 (3) COMMUNICATIVE ENGLISH AND TECHNICAL WRITING
(ELECTIVE I) 3 – 1 – 0
(Common with F 08.705D)

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.
3. Effective Technical Communication – Barun K Mitra, Oxford University Press.
4. Everyday Dialogues in English – Robert J Dixson, PHI.
5. English For Technical Communication, Vol. I &II – K R Lakshmi Narayanan-Sci Tech Publications.
6. Wings of Fire-an autobiography – APJ Abdul Kalam, Universities Press

Internal Continuous Assessment *(Maximum Marks-50)*

25 Marks - Tests (minimum 2)

15 Marks - Assignments (minimum 3) such as home work, problem solving, literature survey, seminar, term-project, software exercises, etc.

10 Marks - Regularity in the class

University Examination Pattern

Module I ***Short answer questions*** *6 x 5 marks=30 marks*

Six questions to be answered out of eight questions. Questions to be limited to the topics ***Writing Skills and Basics of Technical Communication.***

Module II ***Descriptive questions*** *2 x 15 marks=30 marks*

Two questions to be answered out of four questions.

Module III ***Essay Questions*** *2 x 20 marks=40 marks*

Two questions to be answered out of four questions

Maximum Total Marks: 100

08.704 (4) PATTERN RECOGNITION AND SCENE ANALYSIS (ELECTIVE I) 3 – 1 – 0

Module I (16 hours)

Introduction. Probability – Probabilities of events, Random Variables, Joint Distributions and Densities, Moments of Random Variables, Estimation of Parameters from Samples, Minimum Risk Estimators. *Statistical Decision Making* – Bayes' Theorem, Multiple Features, Conditionally Independent Features, Decision Boundaries, Unequal Costs of Error, Estimation of Error Rates, The Leaving-One-Out Technique, Characteristic Curves, Estimating the Composition of Populations.

Module II (18 hours)

Nonparametric Decision Making – Histograms, Kernel and Window Estimators, Nearest Neighbor Classification Techniques, Adaptive Decision Boundaries, Adaptive Discriminant Functions, Minimum Squared Error Discriminant Functions, Choosing a Decision Making Technique. *Clustering* – Hierarchical clustering, Partitional Clustering. *Artificial Neural Networks* – Nets without Hidden Layers, Nets with Hidden Layers, Back-Propagation Algorithm, Hopfield Nets.

Module III (18 hours)

Processing of Waveforms and Images – Gray Level Scaling Transformations, Histogram Equalization, Geometric Image Scaling and Interpolation, Smoothing Transformations, Edge Detection, Laplacian and Sharpening Operators, Line Detection and Template Matching, Logarithmic Gray Level Scaling. *Image Analysis* – Scene Segmentation and Labelling, Counting Objects, Perimeter Measurement, Following and Representing Boundaries, Least Squares and Eigenvector Line Fitting, Shapes of Regions, Morphological Operations, Texture.

Text Books:

1. Pattern Recognition and Image analysis – E. Gose, R. Johnsonbaugh, S. Jost, , PHI

Reference Books:

1. Pattern Classification – R. O. Duda, P.E. Hart, D.G. Stork, , Wiley India Edition
2. Pattern Classification and Scene Analysis – R.O. Duda and P. E. Hart, John Wiley & Sons, New York, 1973.
3. Syntactic Pattern Recognition and Applications – K.S. Fu, , Prentice Hall, Eaglewood cliffs, N.J.,1982
4. Pattern Recognition, 3rd Edn – S. Theodoridis, K. Koutroumbas, Elsevier
5. Neural Network for Pattern Recognition – C. M. Bishop, Oxford University Press, New York, 1998

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.704 (5) CONTROL SYSTEMS ENGINEERING (ELECTIVE I) 3 – 1 – 0

Module I (18 hours)

Open loop and closed loop control systems: Transfer function – Poles and zeros – Transfer function of linear systems – Simple electrical, mechanical, and electromechanical systems – Block diagram representation – Block diagram reduction – Signal flow graph – Mason's gain formula.

Module II (18 hours)

Time domain analysis: Standard test signals – Order of a system – Time response of first and second order systems – Damping ratio – Natural frequency – Time domain specifications – Steady state errors – Static error constants – Generalized error series. *Frequency domain analysis*: Frequency domain specifications – Frequency response of a second order system – Gain margin and phase margin. *Concept of stability*: Routh Hurwitz criterion – Nyquist stability criterion.

Module III (16 hours)

Control System Components: Error detectors – Potentiometers and Synchros – Tachogenerators – Servomotors and Gear trains. *Transducers*: Variable Resistance, Inductance and capacitance displacement transducers. Strain gauges – Principle of operation of strain gauges. Pressure transducers – Potentiometric, inductive and capacitive transducers. Electromagnetic flow meter. Temperature Sensors – Platinum resistance thermometer – Thermistors – Thermo couple.

Text Books:

1. Control Systems Engineering – I. J. Nagarath and M. Gopal, New Age Int., New Delhi (Modules I and II).
2. Control Systems Engineering – S. K. Bhatacharya, Pearson Education (Module III)
3. Introduction to Instrumentation and Control – A.K. Ghosh, PHI (Module III).

Reference Books:

1. Modern Control Engineering – K. Ogata, Prentice-Hall of India, New Delhi.
2. Automatic Control Systems – B.C. Kuo and Golnaraghi, Wiley India.
3. Modern Control Systems – R. C. Dorf and R. H. Bishop, Pearson Education.
4. Instrumentation Devices and Systems – C. S. Rangan, G. R. Sarma and V. S. V. Mani, TMH (Module III).

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.705 (1) ADVANCED DATABASE MANAGEMENT SYSTEM (ELECTIVE II) 3 – 1 – 0

Module I (17 hours)

Overview of relational database concepts- distributed DBMS – concepts and design- functions and architecture of DDBMS- distributed relational database design- transparencies in DDBMS- distributed transaction management- concurrency control deadlock management- distributed database recovery- replication servers- query optimization- mobile database

Module II (17 hours)

Object DBMS- weaknesses of RDBMS- object oriented concepts- storing objects in relational database- OODBMS concepts and design – perspectives- persistence- issues in OODBMS- advantages and disadvantages- object group- object database standard – object store object-relational database examples

Module III (18 hours)

Web technology and DBMS- web as application platform – data warehousing concepts – data warehouse architecture- online analytical processing – OLAP benchmarks, applications, benefits and tools – introduction to data mining

Text Books:

1. Database systems, a practical approach to design implementation and management – Thomas Connolly and Caroly Begg, Pearson Education

Reference Books:

1. Fundamentals of database systems – Elmasri and Navathe, Addison Wesley
2. Object oriented interfaces and databases – Rajesh Narang, PHI
3. Object oriented database systems: approaches and architectures – C S R Prabhu, PHI
4. Database management systems – R Panneerselvam, PHI
5. Data Warehousing – C S R Prabhu, PHI

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	

Maximum Total Marks: 100

08.705 (2) COMPUTER HARDWARE AND INTERFACING (ELECTIVE II) 3 – 1 – 0

Module I (17 hours)

CPU Essentials – Modern CPU concepts, Architectural performance features, CPU over clocking – over clocking requirements, over clocking the system.

Memory – How memory works, Memory chips and modules – DIPP, SIPP, SIMM, DIMM, SO-DIMM, RIMM. Memory types, Advanced memory technologies – RDRAM, DDRAM, PPRAM.

Motherboard – Motherboard Controllers and System Resources – Memory address conflicts and memory map, IRQ, Chipsets – Northbridge, Southbridge, Functions of Chipset. ROM BIOS, ROM POST. CMOS Setup.

Module II (17 hours)

Power Supply, Cooling and Protection – Power Supply Functions and operations, Power Supply Form Factors, Ventilation and Cooling Protection – Power supply fan, Processor Cooling, Temperature limits. Backup Power Systems – UPS.

Mass Storage Interfaces – IDE interface – ATA standards, Data transfer modes. SCSI interface – SCSI standards, SCSI hardware.

Magnetic Storage Devices –Writing and Reading data, Magnetic Encoding Schemes – MFM and RLL Encoding. Hard disk drives – Cylinders, Tracks and Sectors, Hard drive components, Hard drive Specifications.

Optical Storage Devices – Optical storage media, CD ROM drives. CD-RW. DVD ROM drives – DVD drive and decoder.

Module III (18 hours)

I/O Ports and Devices –Serial ports, Parallel ports, Universal Serial Bus. I/O System Bus – Industry Standard Architecture (ISA), Micro Channel Architecture (MCA), Enhanced Industry Standard Architecture (EISA), Peripheral Components Interconnect (PCI), Accelerated Graphics Port (AGP). Keyboards – Keyboard Layouts and Connectors. Video Adapters – characteristics, video standards. Audio Subsystems – Audio Applications, MIDI, Audio Adapter architecture.

Text Books:

1. PC Hardware: The Complete Reference – Craig Zacker, John Rourkie, Tata McGraw-Hill Edition.

Reference Books:

1. Microprocessors, PC Hardware and Interfacing – N. Mathivanan, PHI.
2. Troubleshooting, Maintaining and Repairing PCs, 5th Edn – Stephen J. Bigelow, Tata McGraw-Hill.
3. The complete PC Upgrade and Maintenance Guide – Mark Minasi, Wiley India
4. Upgrading and Repairing PCs – Scott Mueller, Pearson Education.
5. The Indispensable PC Hardware Book – Hans-Peter Messmer, Addison-Wesley
6. IBM PC and Clones: Hardware, Troubleshooting and Maintanence – B. Govindarajalu, Tata McGraw-Hill

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module.	

Maximum Total Marks: 100

08.705 (3) NEURAL COMPUTING (ELECTIVE II) 3 – 1 – 0

Module I (18 hours)

Introduction – Brain and Computer – learning in biological systems and machines – the basic neuron – modeling a single neuron – learning in simple neurons – the perceptron – the perceptron learning rule – proof – limitations of perceptron – the multilayer perceptron – the multilayer perceptron learning rule – Back Propagation network – Counter Propagation network.

Module II (16 hours)

Associative memory – introduction – the learning matrix – Hopfield networks – storage and retrieval algorithms – the energy landscape – Bi-directional associative memory – the Boltzman machine – Boltzman machine learning algorithm – Radial basis function networks.

Module III (18 hours)

Kohonen self organizing networks – introduction – the Kohonen algorithm – weight training – neighbourhoods – reducing the neighbourhood – learning vector quantization – the phonetic typewriter – Adaptive resonance theory (ART) – architecture and operation – ART algorithm – training the ART network – classification – application of neural networks.

Text Books:

1. Neural Computing: An Introduction – Beale R. and Jackson T., IOP Publishing Ltd/Adam Hilger.

Reference Books:

1. Neural Computing: Theory and practice – Philip D. Wasserman, Van Nostrand Reinhold Co publishing
2. Neural Networks Algorithms, Applications and Programming Techniques – J.A. Freeman and D.M. Skapura, Addison-Wesley/Pearson Education.
3. Fundamentals of Neural Networks: Architectures, Algorithms, and Applications – L. Fausett, Prentice Hall Inc./Pearson Education.
4. Artificial Neural networks – B. Yegnanarayana, PHI
5. Neural Networks: A Classroom Approach – S. Kumar, Tata McGraw Hill Publishing Company Ltd.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.705 (4) DATA MINING TECHNIQUES (ELECTIVE II) 3 – 1 – 0
(Common with F 08.706C)

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, Nueral 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.

Text Books:
1 Data Mining:Concepts and Techniques – Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers
2. Data Mining:Introductory and Advanced Topics – Margaret H.Dunham and 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, TMH
4 Data Mining Methods and Models – D.T. Larose, Wiley

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.705 (5) C# AND .NET FRAMEWORK (ELECTIVE II) 3 – 1 – 0

Module I (17 hours)

Introduction To C#: Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

Object Oriented Aspects Of C#: Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

Module II (17 hours)

Application Development On .NET: Building Windows Applications, Accessing Data with ADO.NET.

Web Based Application Development On .NET: Programming Web Applications with Web Forms, Programming Web Services.

Module III (18 hours)

The CLR And The .NET Framework: Assemblies, Versioning, Attributes, Reflection, Viewing MetaData, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.

Text Books:

1. Programming in C# – E. Balagurusamy, , Tata McGraw-Hill, 2004.
2. Programming C#, 2nd Edn – J. Liberty, O'Reilly Media publisher, 2002.
3. C# and the .NET Platform, 2nd Edn – Andrew Troelsen, A! Press,Wiky India,2003.

Reference Books:

1. The Complete Reference: C# – Herbert Schildt, Tata McGraw-Hill, 2004.
2. Professional C#, 2nd Edn – Robinson et al, 2nd ed., Wrox Press, 2002.
3. A Textbook on C# – S. Thamarai Selvi, R. Murugesan, Pearson Education, 2003.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module	

Maximum Total Marks: 100

08.706 COMPUTER HARDWARE AND INTERFACING LAB 0 – 0 – 4

The exercises may include the following. Programs are to be developed preferably in C language. The ALP may also be used.

1. Familiarization of the components / Cards inside a computer, standard connectors, cords, different ports, various computer peripherals. NIC and other I/O cards, and their uses.
2. Assembling of PC from Components.
3. Interfacing with parallel ports:-
   - Interfacing LEDs, 7 segment display devices, relays, sensors etc.
   - Testing of simple logic gates using parallel port.
   - Data transfer to the printer by direct access of parallel port registers
   - Inputting external data using the unidirectional/bidirectional parallel port.
   - Controlling a stepper motor using parallel port.
   - Interfacing ADC and DAC to parallel port.
   - PC to PC data transfer using parallel port.
4. Interfacing using serial ports:-
   - Finding the base addresses of COM ports in a system.
   - Data acquisition through COM port using ADC chip.
   - Serial communication between two computers using BIOS serial port services
5. 8051 Micro controller experiments:-
   - Familiarization of 8051 trainer kit by executing simple Assembly Language programs such as Multi byte addition, searching, sorting, and code conversion
   - Interfacing experiments with 8051:-
     - Data transfer using serial port
     - LCD interfacing
     - Keyboard interfacing
     - Sensor interfacing

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term projects, assignment-software/hardware exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce.
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:

- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

08.707 OPERATING SYSTEMS AND NETWORK PROGRAMMING LAB 0 – 0 – 4

1. Inter-process communication using mail boxes, pipes, message queues and shared memory
2. Implementation of dining philosophers problem by multiprogramming using threads, semaphores and shared memory
3. Implementation of bankers algorithm
4. Software simulation of Medium Access Control protocols – 1) Go Back N. 2) Selective Repeat and 3) Sliding Window
5. Implementation of a sub set of simple mail transfer protocol using UDP
6. Implementation of a sub set of a file transfer protocol using TCP/IP
7. Implementation of finger utility using remote procedure call (RPC)

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term projects, assignment-software exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce.
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:

- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

08.708 PROJECT DESIGN AND SEMINAR 0 – 0 – 4

PROJECT DESIGN:

The project is aimed at improving the professional skill and competency of the students. The project is for a period of two semesters and students (not more than 4 members in a group) are expected to carry out a complete project. The titles of the projects and the guiding faculty members should be identified at the beginning of the seventh semester.

The design and development of the project may include hardware and/or software. The project is expected to be completed in the eighth semester. The seventh semester is mainly for the preliminary works of the project viz. design of the project, literature survey, collection of materials and fabrication methodology etc. An interim report is to be submitted by each student at the end of the seventh semester.

For the award of the sessional marks, the interim report and the students' involvement in the preliminary works of the project shall be assessed by a panel consisting of the Head of the Department, project coordinator, project guide, and a senior faculty member. The Head of the Department shall be the chairman of the panel. The students may be assessed individually and in groups.

SEMINAR:

Each student is required to present a seminar on a topic of current relevance in Computer Science and Engineering. They are expected to refer research and review papers from standard journals like ACM, IEEE, ELSEVIER, IEE, COMPUTER JOURNAL, etc. Each student shall give a power point presentation of 30 minutes duration on his/her seminar topic in an audience of students and staff members from the department. Students from lower semesters may also attend the seminar presentation. The seminar presentation shall be assessed by a panel consisting of the Head of the Department, seminar coordinator, and 2/3 faculty members. The Head of the Department shall be the chairman of the panel.

Each student should also prepare a well-documented report on the seminar topic as per an approved format and submit to the department at the time of his/her seminar presentation. Students may follow the guidelines given in **APPENDIX (R)** to prepare the seminar report. While preparing the report, at least three cross-references must be used. The seminar report must not be the reproduction of the original report. The seminar report will also be evaluated for the award of sessional marks.

Internal Continuous Assessment *(Maximum Marks-100)*

Marks should be awarded as follows:

40 Marks - Project preliminary works
40 Marks - Seminar presentation, clarity in presentation, awareness to the topic, response to the audience etc.
20 Marks - Evaluation of the seminar report

08.801 SOFTWARE ENGINEERING AND PROJECT MANAGEMENT 2 – 1 – 0

Module I (13 hours)

Introduction to software engineering- scope of software engineering – historical aspects, economic aspects, maintenance aspects, specification and design aspects, team programming aspects. Software engineering a layered technology – processes, methods and tools. Software process models – prototyping models, incremental models, spiral model, waterfall model. Capability maturity model (CMM), ISO 9000. Phases in Software development – requirement analysis- requirements elicitation for software , analysis principles, software prototyping, specification.

Module II (13 hours)

Planning phase – project planning objective, software scope, empirical estimation models- COCOMO, single variable model, staffing and personal planning. Design phase – design process, principles, concepts, effective modular design, topdown, bottom up strategies, stepwise refinement. Coding – programming practice, verification, size measures, complexity analysis, coding standards. Testing – fundamentals, white box testing, control structure testing, black box testing, basis path testing, code walkthroughs and inspection, testing strategies-Issues, Unit testing, integration testing, Validation testing, System testing. Maintenance-Overview of maintenance process, types of maintenance.
Risk management: software risks-risk identification-risk monitoring and management

Module III (13 hours)

Project Management concept: People – Product-Process-Project.
Project scheduling and tracking: Basic concepts-relation between people and effort-defining task set for the software project-selecting software engineering task
Software configuration management: Basics and standards
User interface design- rules. Computer aided software engineering tools - CASE building blocks, taxonomy of CASE tools, integrated CASE environment.

Text books:

1. Software Engineering – Roger S. Pressman, McGraw Hill
2. Software Project Management : A unified frame work – Walker Royce, Pearson Education.

Reference Books

1. Software Engineering – Ian sommervile, University of Lancastor, Pearson Education
2. Software Engineering – K K Aggarwal and Yogesh Singh, New age International Publishers.
3. Software Project Managementh: A consise study – S.A. Kelkar, PHI
4. Software Engineering Project Management – (Edited) R.H. Thayar, Wiley

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.802 COMPUTER SYSTEM ARCHITECTURE 3 – 1 – 0

Module I (16 hours)

Parallel computer models - The state of computing, multi processors and multi computers, multi vector and SIMD computers, Parallel Random Access Machines and VLSI complexity model, Architectural development tracks. Program and network properties - conditions of parallelism, system interconnect architectures. Principles of scalable performance- scalability analysis and approaches.

Module II(18 hours)

Processors and memory hierarchy – advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology. Bus and shared memory - backplane bus systems, shared memory organizations. Pipelining and superscalar techniques –
linear vs. nonlinear pipelining, instruction pipeline design, arithmetic pipeline design, superscalar and super pipeline design

Module III(18 hours)

Multiprocessors and multicomputers - multiprocessor system interconnects, cache coherence and synchronization mechanism, three generations of multicomputers, Intel Paragon system architecture. Multivector and SIMD computers - vector processing principles, multivector multiprocessors, SIMD computer organizations. Scalable, multithreaded and data flow architectures - latency hiding techniques, principles of multithreading, scalable and multithreaded architectures, data flow and hybrid architectures.

Text Books:

1. Advanced Computer Architecture, Parallelism, Scalability, Programmability, 2001 Edn – K. Hwang, TMH.

Reference Books:

1. Computer Architecture and Parallel Processing – K. Hwang & Briggs, McGraw Hill International.
2. Computer Organization and Design: The Hardware/Software Interface, 3rd Edn – Patterson D. A. and Hennessy J. L., Morgan Kaufmann
3. Computer Architecture and Organization – H.P. Hayes, McGraw Hill.
4. The Architecture of Pipelined Computer – P.M. Kogge, McGraw Hill.
5. Introduction to Parallel Processing – M. Sasikumar, D. Shikkare, P. Raviprakash, PHI.
6. Computer System Architecture – P.V.S. Rao, PHI.
7. Computer Architecture : Pipelined and Parallel Processor Design – M. J. Flynn, Narosa.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.803 CRYPTOGRAPHY AND NETWORKS SECURITY 2 – 1 – 0

Module I (14 hours)

Symmetric Cipher Models- Substitution techniques- Transposition techniques- Rotor machines- Steganography- DES: Simplified DES- Block Cipher principals- The Data Encryption Standard. The Strength of DES- Differential and linear Cryptanalysis- Block Cipher Design principles- Block Cipher modes of operations- IDEA: Primitive operations- Key expansions- One round, Odd round, Even Round- Inverse keys for description.

AES: Basic Structure- Primitive operation- Inverse Cipher- Key Expansion, Rounds, Inverse Rounds.

Module II (13 hours)

Public key Cryptography :- Principles of Public key Cryptography Systems, Number theory- Modular arithmetic, Prime numbers. RSA algorithms- Key Management - Diffie-Hellman Key Exchange, Elliptic curve cryptography- Authentication requirements- Authentication functions- Message authentication codes- Hash functions- SHA, MD5, Security of Hash functions and MACS- Digital signatures- Authentication protocols- Digital signature standards.

Module III (12 hours)

Network security: Electronic Mail Security: Pretty good privacy- S/MIME

IP Security: Architecture- authentication Header- Encapsulating Security payload- Combining Security associations- Key management. Web Security: Web Security considerations- secure Socket Layer and Transport layer Security- Secure electronic transaction. Firewalls-Packet filters- Application Level Gateway- Encrypted tunnels.

Text Books:

1. Cryptography and Network Security – William Stallings, Pearson Education
2. Cryptography and Network Security – Behrouz A. Forouzan, Tata McGraw-Hill.
3. Applied Cryptography, Protocols, Algorithms, and Souce Code in C, 2nd Edn – B. Schneier, Wiley.

Reference Books:

1. Network Security – Charlie Kaufman, Radia Perlman, Mike Speciner.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module	
		Maximum Total Marks: 100

08.804 DISTRIBUTED SYSTEMS 2 – 1 – 0

Module I (12 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 (14 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. Operating system support: Operating system layer – protection – processes and threads- communication and invocation – Operating system architecture security: Overview of security techniques

Module III (13 hours)

Distributed file system: File service architecture - network file system- Andrew file system-recent advances Transactions and concurrency control: nested transactions-locks-optimistic concurrency control-comparison of methods for concurrency control-flat and nested distributed transactions- distributed deadlocks-transactions recovery. Replication System model and group communication- fault tolerant services-transactions with replicated data

Text Books:

1. Distributed Systems: Concepts and Design – G. Coulouris, J. Dollimore and T. Kindberg, Pearson Education

Reference Books:

1. Distributed Systems: Principles and paradigms – A.S. Tanenbaum and M.V. Steen, Pearson Education
2. Distributed Systems and Computer Networks – M. Solomon and J. Krammer, PHI

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.805 (1) FUZZY SET THEORY AND APPLICATIONS (ELECTIVE III) 3 – 1 – 0

Module I (18 hours)

Uncertainty and imprecision, Fuzzy sets and membership. Classical sets and Fuzzy sets, Operations, Properties. Classical relations and Fuzzy relations, Cartesian product, Crisp and Fuzzy relations, Tolerance and Equivalence relations, Cosine amplitude method, Max-Min method. Membership functions, Features, Various forms, Fuzzification, Membership value assignments, Intuition, Inference, Rank ordering, Inductive reasoning.

Module II (16 hours)

Defuzzification to Crisp sets, Lambda-Cuts (λ-cuts) for Fuzzy sets and relations, Defuzzification methods. Classical Logic and Fuzzy Logic. Fuzzy systems, Natural language, Linguistic hedges. Fuzzy rule-based systems, Graphical techniques of inference.

Module III (18 hours)

Applications, Fuzzy Controllers (overview & example), Fuzzy Systems and Neural Networks, Fuzzy Neural Networks, Fuzzy Clustering, Fuzzy Pattern Recognition, Fuzzy Image Processing, Fuzzy Databases and Information retrieval systems.

Text Books:

1. Fuzzy Logic with Engineering Applications – Timothy J. Ross, Wiley Int. Edition (Modules I and II)
2. Fuzzy Sets and Fuzzy Logic: Theory and Applications – George J. Klir and Bo Yuan , PHI (Module III)

Reference Books:

1. Fuzzy Sets, Uncertainty, and Information – George J. Klir and Tina A. Folger, PHI
2. Fuzzy Set Theory and its Applications – H.J. Zimmerman, Kluwer Academic Publishers
3. Fuzzy Logic: Intelligence, Control, and Information – John Yen and Reza Langari, Pearson Education

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module	
		Maximum Total Marks: 100

08.805 (2) SOFTWARE ARCHITECTURE (ELECTIVE III) 3 – 1 – 0

Module I (17 hours)

Introduction to Software architecture – Architectural styles – pipes and filters – data abstraction and object oriented organization – Event based, Implicit invocation, Layered systems – Repositories – Interpreters – Process control – Heterogeneous Architectures - Case Studies – Keyword in Context – Instrumentation Software – Mobile Robotics – Cruise Control

Module II (18 hours)

Shared Information Systems – Integration in software Development Environment – Integration in the design of Buildings – Architectural structures for shared information systems - Guidance for user interface architecture Quantified design space – Formal models and specifications-The value of architectural formalism – Formalizing the architecture of a specific system – Formalizing the architectural style – Formalizing an architectural design space

Module III (17 hours)

Linguistic issues - Requirements for architecture – Description languages – First class connectors – Adding implicit invocation to factorial processing languages. Tools for architectural design – Unicon – Exploiting style in architectural design environments – Architectural interconnection

Text books:

1. Software Architecture: Perspectives on an Emerging Discipline – Mary Shaw and David Garlan Prentice-Hall, 1996.

Reference Books

1. Software Architecture in Practice, 2nd Edn – Bass, L., P. Clements, and R. Kazman, Prentice-Hall, 2003
2. Pattern-Oriented Software Architecture, Vol 1, A System of Patterns – F. Buschmann, R. Meunier, H. Rohnert, P. Sommerlad, M. Stal, Wiely
3. Pattern-Oriented Software Architecture, Volume 2, Patterns for Concurrent and Networked Objects – D.C. Schmidt, M. Stal, H. Rohnert, F. Buschmann, Wiley
4. Evaluating Software Architectures: Methods and Case Studies – Clements, Paul, R. Kazman, M. Klein, Addison-Wesley, 2001

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.805 (3) MOBILE AND WIRELESS NETWORKS (ELECTIVE III) 3 – 1 – 0

Module I (16 hours)

Introduction: Wireless Networks. Wireless transmission – Frequencies for radio transmission , Signals, Antennas, Signal propagation. Multiplexing. Modulation schemes - Advanced FSK, Advanced PSK, Multi-carrier modulation. Spread spectrum – Direct sequence, Frequency hoping. Principles of Cellular Wireless Networks.

Medium Access Control - SDMA, FDMA, TDMA, CDMA.

Module II (18 hours)

Brief introduction to 2 G, 2.5 G and 3 G networks. Telecommunication Systems: GSM - Mobile services, System Architecture, protocol. Data services – GPRS. DECT, UMTS, IMT-2000.Satellite Networks – Introduction , Satellite Parameters and configurations, Capacity allocation – FAMA-FDMA, DAMA-FDMA, FAMA-TDMA, DAMA-TDMA. Broadcast Systems – Digital Audio Broadcasting, Digital Video Broadcasting. Cordless Systems, WLL.

Wireless LANS: Wireless LAN Technology – Introduction. Infra Red Transmission, Radio Transmission, Wireless LAN Standards – IEEE 802 Protocol Architecture, IEEE 802.11 System Architecture, Protocol Architecture & Services, MAC Layer & Management.

HIPERLAN: Requirements & Architecture. BLUETOOTH: Architecture & Protocol Stack.

Module III (18 hours)

Mobile internet-mobile network layer-mobile IP-dynamic host configuration protocol-ad hoc networks-mobile transport layer-implications of TCP on mobility-indirect TCP-snooping TCP- mobile TCP transmission-selective retransmission, Transaction oriented TCP-support for mobility-file systems-WAP - WML -wireless telephony applications

Text Books:

1. Mobile communications, 2nd Edn – Jochen Schiller, Pearson Education
2. Wireless Communication And Networks – William Stallings, Pearson Education

Reference Books:

1. Wireless Communications, Principles and Practice 2nd Edn – Theodore S. Rappaport, PHI.
2. Wireless and Mobile Netowrk Architectures – Yi-Bing Lin and Imrich Chlamtac, Wiley
3. Principles of Wireless Networks – K. Pahlavan, P. Krishnamoorthy, PHI/Pearson Education, 2003.
4. Wireless Communications and Networking – J. W. Mark and W. Zhuang, Pearson.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.805 (4) GRAPH THEORY (ELECTIVE III) 3 – 1 – 0
(Common with F 08.805C)

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, disconnect 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 III (18 hours)
Graphs 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 cording 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 – Hararay, Narosa Publishers
2. Graph theory – Narasingh Deo, PHI.

Reference Books:
1. Graphs theory applications – L.R. Foulds, Narosa.
2. A first look at graph theory – John clark and Derek Allan Hotton, Allied.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module	
		Maximum Total Marks: 100

08.805 (5) SOFT COMPUTING (ELECTIVE III) 3 – 1 – 0

Module I (18 hours)

Introduction to Soft Computing – Artificial Neural Networks – introduction – basic models – linear separability – Hebb network – Supervised learning networks – perceptron – Adaptive Linear Neuron – back propagation network – radial basis function network – Associative Memory Network – auto associative and hetero associative memory networks – Bidirectional Associative Memory – Unsupervised learning networks – Kohonen self organizing feature maps – Learning Vector Quantization – Counter propagation networks

Module II (18 hours)

Crisp and Fuzzy sets – operations and properties – Crisp and Fuzzy relations – operations and properties – membership functions – features – methods of membership value assessment – Defuzzification – lambda cuts for fuzzy sets and fuzzy relations – Defuzzification methods – Fuzzy arithmetic – Extension principle – fuzzy measures – Fuzzy rules – fuzzy reasoning – Fuzzy inference system – Mamdani and Sugeno models – Fuzzy Logic Control Systems – control system design – architecture and operation – applications.

Module III (16 hours)

Genetic Algorithm – introduction – basic operations and terminologies – general genetic algorithm – classification of genetic algorithm – genetic programming – applications.

Hybrid systems – neuro-fuzzy, neuro-genetic and fuzzy-genetic hybrids – Adaptive Neuro-Fuzzy Inference Systems – architecture – hybrid learning algorithm – Genetic Algorithm based Internet search technique – Soft Computing based hybrid fuzzy controllers – Soft Computing based rocket engine control.

Text Books:

1. Principles of Soft Computing – S. N Sivanandam, S.N Deepa, Wiley India, 2007.

Reference Books:

1. Fuzzy Logic with Engineering Applications – T. J.Ross, Wiley India.
2. Genetic Algorithms: Search, Optimization and Machine Learning – D.E.Goldberg, Addison Wesley, N.Y., 1989.
3. Neural Networks, Fuzzy Logic and Genetic Algorithms – S . Rajasekaran and G.A.V.Pai, PHI, 2003.
4. Computational Intelligence - PC Tools – R.Eberhart, P.Simpson and R.Dobbins, AP Professional, Boston, 1996.
5. Neuro-Fuzzy and Soft Computing – J.S.R.Jang, C.T.Sun and E.Mizutani, PHI/Pearson Education 2004

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.806 (1) ARTIFICIAL INTELLIGENCE (ELECTIVE IV) 3 – 1 – 0

Module I (16 hours)

Artificial Intelligence: History and Applications, Production Systems, Structures and Strategies for state space search- Data driven and goal driven search, Depth First and Breadth First Search, DFS with Iterative Deepening, Heuristic Search- Best First Search, A* Algorithm, AO* Algorithm, Constraint Satisfaction, Using heuristics in games- Minmax Search, Alpha Beta Procedure.

Module II (18 hours)

Knowledge representation - Propositional calculus, Predicate Calculus, Theorem proving by Resolution, Answer Extraction, AI Representational Schemes- Semantic Nets, Conceptual Dependency, Scripts, Frames, Introduction to Agent based problem solving. *Machine Learning*- Symbol based - A frame work for Symbol based Learning, Vision space search, Inductive Bias and learnability, Knowledge and learning, Connectionist – Foundation for connectionist Networks, Perceptron Learning, Back propagation learning. Social and Emergent models of learning – Genetic algorithm, Classifier Systems and Genetic Programming.

Module III (18 hours)

Overview of Expert System Technology- Rule based Expert Systems, Natural Language Processing- Natural Language understanding problem, Deconstructing Language, Syntax, Stochastic tools for Language analysis, Natural Language applications- Story Understanding and Question answering, An information Extraction and Summarization System for the Web.

Language and Programming Techniques for AI- Introduction to PROLOG, Syntax for predicate calculus programming, Abstract Data Types in PROLOG, A production system example in PROLOG, Meta-Predicates, Types and Unification, Meta-Interpreters, Learning algorithms in PROLOG, Natural Language processing in PROLOG.

Text Books:

1. Artificial Intelligence: Structures and Strategies for Complex Problem Solving – G. F. Luger, Pearson Education.

Reference Books:

1. Introduction to Artificial Intelligence and Expert Systems – D. W. Patterson, PHI.
2. Artificial Intelligence, 2nd Edn – E. Rich, K.Knight, Tata McGraw Hill.
3. Artificial Intelligence: A New Synthesis – N. J. Nilsson, Elsevier.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.806 (2) DIGITAL IMAGE PROCESSING (ELECTIVE IV) 3 – 1 – 0

Module I (18 hours)

Introduction - digital image representation - fundamental steps in image processing - elements of digital image processing systems - digital image fundamentals - elements of visual perception - a simple image model - sampling and quantization - basic relationship between pixels - image geometry. Image transforms - introduction to Fourier transform – discrete Fourier transform (DFT) - properties of DFT. Other separable image transforms - Walsh, Hadamard and Discrete Cosine Transforms. Hotelling transform.

Module II (18 hours)

Image enhancement - Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging – Spatial filtering – Smoothing and sharpening filters – Laplacian filters. Enhancement in the frequency domain. Image restoration - Model of Image Degradation/restoration process – Noise models – Inverse filtering -Least mean square filtering – Constrained least mean square filtering

Module III (16 hours)

Edge detection –Thresholding - Region Based segmentation – Boundary representation. Image compression – Fundamental concepts of image compression – Compression models. Lossless Compression – Huffman Coding – Arithmetic coding – Bit plane coding – Run length coding. Lossy compression – Transform coding – Image compression standards.

Text Books:

1. Digital Image Processing – R. C. Gonzalez and R. E. Woods, Pearson Education Asia (P) Limited.
2. Digital Image Processing – S. Jayaraman, S. Esakkirajan and T. Veerakumar, Tata Mc Graw-Hill
3. Digital Image Processing and Analysis – B. Chanda and D.D. Majumdar, Prentice Hall of India (P) Limited.

Reference Books:

1. Fundamentals of Digital Image Processing – A. K. Jain, Prentice Hall of India (P) Limited, New Delhi.
2. Digital Image Processing and Computer Vision – R. J. Schalkoff, John Wiley and Sons, New York.
3. Digital Image Processing – W. K. Pratt, Wiley India.
4. Image Processing, Analysis and Machine vision – M .Sonka, V.Hlavac and R. Boyle, Thomson India Edition.
5. Digital Image Processing – K .R . Castleman, Pearson Education.

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module

Maximum Total Marks: 100

08.806 (3) EMBEDDED SYSTEMS (ELECTIVE IV) 3 – 1 – 0

Module 1(17 hours)

Fundamentals of Embedded Systems- complex systems and microprocessors-
Embedded system design process – requirements- specifications- architecture design- design of hardware and software components- structural and behavioural description.
CPUs - i/o devices- i/o primitives- busy wait i/o- interrupts- supervisor mode- exception- traps- co-processors- caches- memory management- CPU performance.
Process and OS– multiple tasks- context switching- scheduling policies-, interprocess- communication mechanisms.

Module II (17 hours)

Embedded computing platform – CPU bus, memory devices- i/o devices- component interfacing- designing with microprocessor.
Program Design & Analysis -Data flow graphs- basic compilation techniques- analysis & optimization of execution time- program size - Validation and testing- Design example – Software Modem.
Networks – Distributed Embedded Architectures, Networks for embedded systems, Network based design, Internet enabled systems

Module III (18 hours)

Embedded system Design: Microchip PIC16 family, PIC16F873 processor architecture – features- memory organization – general purpose registers – special function registers – on chip peripherals – Watchdog timer – ADC – Data EEPROM – Asynchronous serial port – SPI mode – I2C mode. Interfacing with LCD – ADC – Stepper motor – Key board – DAC, 7 segment LED display.

Text Books:

1. Computers as Components-Principles of Embedded Computer System Design – Wayne Wolf, Morgan Kaufmann
2. The 8051 Microcontroller and Embedded Systems – Muhammed Ali Mazidi, Janice Gillispie Mazidi, Pearson Education
3. Microcontrollers Architecture, Programming, Interfacing and System Design – Rajkamal, Pearson Education.

Reference Books:

1. Fundamentals of Embedded system software – Daniel W Lewis, Pearson Education
2. Embedded System Design – Steve Heath, Butter worth-Heinemann
3. Embedded System Design –Arnold. S. Berger, CMP Books
4. Real Time Systems – Rajib Mall, Pearson Education
5. Embedded Systems: Design and Applications with the 68HC and HCS 12 – S.F. Barret and D.J. Pack, Pearson
6. Introduction to Embedded Systems – Shibu K.V., McHraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.806 (4) INTERNET TECHNOLOGY (ELECTIVE IV) 3 – 1 – 0

Module I (17 hours)

Introduction to Internet. Web Browsers, Web Servers Web Design. HTML. Java Script – Simple Java Script. Variables, Objects, DOM. DHTML, XML – Introduction, Key components, KTD and Schemas. PHP – Control Loops, Arrays, Functions & Forms.

Module II (17 hours)

Proxy Server, Search Engines, Plug-ins and Helper Applications. Web Server hardware & software – software for Web Server – Website & internet utility program – Web Server hardware – E-commerce software – basic function of E-commerce software – payment system for e-commerce – online payment basics – payment cards – electronic cash – electronic wallets – stored value cards.

Module III (18 hours)

NAT, VPN, DHCP.DNS – Namespace, Internet Domain Names, Mapping Domain Names to Address, Domain Name Resolution.Remote Login & Desktop - Telnet, SSH File Transfer and Access - FTP, TFTP, NFS. Electronic Mail - SMTP, POP, IMAP, MIME, Worldwide Web, HTTP. Video over IP.

Text Books:

1. Developing Web Applications – Ralph Moseley, Wiley India
2. E-commerce Strategy, Technology & Implementation – Garhy P. Schneider, Cengage Learning India Edition
3. Internetworking with TCP/ IP, Principles, Protocols and Architectures Vol 1, 5th Edn – D.E. Comer, PHI.

Reference Books:

1. Computer Networks, Fourth Edition – Andrew S Tanenbaum, PHI.
2. TCP/IP Protocol Suite – B.A. Forouzan, TMH

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A:	***Short answer questions***	*10 x 4 marks=40 marks*
	All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.	
PART B:	***Descriptive/Analytical/Problem solving questions***	*3 x 20 marks=60 marks*
	Candidates have to answer one question out of two or two questions out of four from each module	

Maximum Total Marks: 100

08.806 (5) BIOINFORMATICS (ELECTIVE IV) 3 – 1 – 0

Module I (17 hours)

Introduction to Life Sciences: Levels of organization in nature: atom, molecule, organelle, cell, tissue, organ, organ system; Unicellular and multicellular organisms; Branches of Biology - Cell Biology - Cell as the structural and functional unit of life - Structural components of cell - Types of cells - Prokaryotic, Eukaryotic, Animal and Plant cell; Important Biomolecules- Nuclei acids, proteins, enzymes.

Central Dogma: DNA, RNA and Protein; Chromosome, Genome, Genes, Gene Loci, Gene Sequencing – Short gun and Contig approach; Restriction Enzyme, restriction sites, DNA copying/amplification, PCR and Electrophoresis.

Module II (18 hours)

Genomics & Proteomics: String view of DNA, Reading Frames (+1, +2, +3, -1, -2, -3), Open reading frame, codon, genetic code, transcription & translation- mRNA, sense and anti-sense strands, rRNA, tRNA, upstream and downstream, genomic DNA, complimentary DNA, introns and exons, alternative spicing, junk DNA, Sequence databases- GenBank, EMBL and DDBJ- concepts of similarity- homologous- orthologous and paralogous sequences, FASTA file format.

Sequence alignments- need for alignment - local and global alignments – pair-wise and multiple – PAM and BLOSSUM matrices – Needleman–Wunch and Smith-Waterman algorithms – Study on BLAST results. Gene structure – typical prokaryotic and eukaryotic gene structures – Single Nucleotide Polymorphisms (SNPs); Concepts of Phylogenetics, Distance based methods to draw phylogenetic trees – UPGMA and NJ algorithm. Study of ClustalW/ClustalX, Phylip and NJ Plot software.

Proteome and proteomics – proteins as workhorse molecules of life; protein separation using 2D gel electrophoresis; Study on amino acids and four levels of protein structure – Protein databases – PDB, Uniprot

Module III (17 hours)

Basics of Computer Aided Drug Design (CADD), Microarray Bioinformatics, Synthetic Biology and Systems Biology. Soft computing methods in Bioinformatics – Basics of Hidden Markov Models, Artificial Neural Networks, Genetic Algorithms and Ant Colony Optimization.

Text Books:

1. Essential Biology (Abridged) Campbell, Cambridge
2. Fundamental Concepts of Bioinformatics – D. E. Krane and M. L. Raymer, Pearson education

Reference Books:

1. Bioinformatics: Sequence & Genome Analysis – D. Mount, Cold Spring Harbor press, USA (Indian edition)
2. Microarray Bioinformatics – D. Stekel, Cambridge University Press (Indian Edition)
3. Computer Aided Drug Design: Methods and Applications – (Edited) T. J Perun, C. L Propst, Marcel Dekker.
4. Systems Biology & Synthetic Biology – Pengcheng Fu and Syen Panke, Wiley.
5. www. Wikipedia – Soft computing methods (refer study materials for)

Internal Continuous Assessment *(Maximum Marks-50)*

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

University Examination Pattern

PART A: ***Short answer questions*** *10 x 4 marks=40 marks*

All questions are compulsory. There should be at least three questions from each module and not more than four questions from any module.

PART B: ***Descriptive/Analytical/Problem solving questions*** *3 x 20 marks=60 marks*

Candidates have to answer one question out of two or two questions out of four from each module.

Maximum Total Marks: 100

08.807 ALGORITHM DESIGN LAB 0 – 0 – 4

1. Line drawing algorithm,
2. Circle drawing algorithm,
3. Problems related to 2D transformations – Scaling, translation and rotation.
4. Line clipping and polygon clipping algorithms.
5. Polygon filling and hatching algorithms.
6. Alphanumeric character generation.
7. Animation,
8. Transformation and projections of 3D objects, back face removal algorithm.
9. Representation of graphs using adjacency lists, implementation of graph searching algorithms – DFS and BFS.
10. Generation of tree edges.
11. Implementation of Kruskal's algorithm to compute minimum cost spanning tree.
12. Implementation of Dijkstra's shortest path algorithm and graphic simulation.
13. Height balanced trees (Red-black tree) - insertion and deletion operations.
14. Implementation of scan line algorithm for hidden surface elimination using height balanced trees.
15. Matrix chain ordering and multiplication using dynamic programming.

Internal Continuous Assessment *(Maximum Marks-50)*

20 Marks - Tests (minimum 1)
20 Marks - Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term projects, assignment-software exercises, etc.
10 Marks - Regularity in the class

University Examination Pattern *(Maximum marks – 100)*

Marks should be awarded as follows:

20 Marks - Algorithm/Design.
25 Marks - Viva voce.
30 marks - Implementing the work/Conducting the experiment.
25 Marks - Output/Results and inference.

General instructions:

- Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.
- The number of candidates evaluated per day should not exceed 20

03.808 PROJECT WORK AND VIVA VOCE 0 – 0 – 4

PROJECT WORK:

The project is the continuation of the seventh semester project. Students are expected to utilize the project time for the development and implementation of the project whose design and other works have been completed in the seventh semester. A detailed project report in soft bound in an approved format is to be submitted at the end of the semester. Students may follow the guidelines given in **APPENDIX (R)** to prepare the project report.

The performance of the students in the project work shall be assessed on a continuous basis. There shall be at least an interim evaluation and a final evaluation of the project work. Each student in the group may give a power point presentation on the project work during the evaluation process. For the award of the sessional marks, the project report and the power point presentation of the project work shall be assessed by a panel consisting of the Head of the Department, project coordinator, project guide, and a senior faculty member. The Head of the Department shall be the chairman of the panel. The students may be assessed individually and in groups.

VIVA VOCE:

At the time of viva-voce examination, the project work has to be evaluated in addition to assessing the students' knowledge in the field of Computer Science and Engineering and other related and advanced topics. He/she is expected to present his/her academic records including project report, seminar report, etc. at the time of viva-voce examination. Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.

Internal Continuous Assessment *(Maximum Marks-100)*

Marks should be awarded as follows:

25 Marks - Presentation/viva, clarity in presentation, awareness to the work/topic etc.
50 Marks - Current relevance of the work, implementation/experimentation of the work, involvement in the work etc.
25 Marks - Evaluation of the report

University Examination Pattern – VIVA VOCE *(Maximum marks – 100)*

Marks should be awarded as follows:

50 Marks - General topics covering Computer Science and Engineering and other related and advanced topics.
35 Marks - Project work.
15 Marks - Seminar topic

APPENDIX (R)

GUIDELINES FOR PREPARATION OF MINI /MAJOR PROJECTS AND SEMINAR REPORTS FOR B.TECH

Facing page: The title of the project, list of students with roll numbers, name of guide, department, month and year of submission along with the Institute address and emblem will be included on the first cover. This may be made in special quality paper like plastic coated paper.

Inner cover: Contents can be same as that of the front cover, but on ordinary A4 size paper.

The report may contain three main parts. These include the preliminary part, body of the report, and reference and appendices (if any) as the concluding or final part. The order of these items is as given below.

PRELIMINARY PART
Certificate from staff member in-Charge
Acknowledgements, if any
Abstract
Contents
List of abbreviations, if any
List of figures, if any
List of tables, if any

BODY OF THE PROJECT REPORT

Chapter I INTRODUCTION
Motivation and Overview
Literature Survey, if any

Chapter II MATERIALS AND METHODOLOGY
Algorithms, if any
Program development, if any
……
……..

Chapter N-1 RESULTS AND DISCUSSIONS

Chapter N: CONCLUSIONS AND SUGGESTIONS FOR FURTHER WORK

CONCLUDING PART

References
Appendix or Appendices

Abstract
It should be a concise description of the problem(s) addressed and your method of solving it/them, your results and conclusions. An abstract must be self-contained. The number of words may be limited not exceeding three-quarter of a page of spacing 1.5 and font type Times New Roman with size 12.

Contents
The contents should list the chapter headings, sections and subsections of the different chapters along with page numbers of each. It should be possible to get a complete picture of the project report by looking at the contents.

List of abbreviations
List the full form of the abbreviations used

List of figures
List the number and captions of the figures with page numbers

List of tables
List the number and titles of the tables with page numbers

Page numbering
The preliminary parts are numbered in *roman numerals* (i, ii, etc). The first page of the first chapter (Introduction) onwards will be numbered in *Arabic* numerals 1 2 3 etc.

Numbering sections, subsections, equations, figures etc
It is common practice to use decimal numbering in the report. If the chapter number is 2, the section numbers will be 2.1, 2.2, 2.3 etc. The subsections in section 2.2 will be numbered as 2.2.1, 2.2.2 etc. Unless essential, it is not necessary to use numbers to lower levels than three stages. Headings of paragraphs below the subsections may be bold faced and in sentence case.
Similarly, it is useful and convenient to number the figures also chapter-wise. The figures in chapter 4 will be numbered Fig.4.1, Fig 4.2 etc. This helps you in assembling the figures and putting it in proper order. Similarly, the tables also numbered as Table 4.1 Table 4.2 etc. Usually the figure captions are written *below the figure* and table captions *on top of the table*. All figures should have proper description by legends, title of the axes and any other information to make the figures self-explanatory. Figures in colour are not essential, but if it is essential, can be given.
The same numbering scheme can be used for equations also. Only thing to be remembered is that references to the figures are made like Fig 4.2 and equations as Eqn (5.8) and tables as Table 3.8. If there are some appendices, these can be numbered as A1, A2, A3 etc. The equations in these appendices can be numbered as (A1.1), (A2.3) etc.
All figures and tables must be in place in the text near, but not before, where they are first mentioned.
References can be numbered as 1, 2, 3 etc in the order in which they are referred to in the body of the report. A typical reference in the body of the report will appear as “as stated in [3] or in [3] – [5]” etc.

References to journal papers should contain the *name of the author(s), title of the paper, name of the journal, volume number, issue number, particular pages (pp) and year of publicatio*n.
Example:
Abcddfrtgyf T M, Pqrstmyutfd V K, Xyzmnjuhf M : Improving BTC image compression Using a fuzzy complement edge operator, Signal Processing Journal (ELSEVIER) 88(12), Dec. 2008, pp 2989-2997.

Similarly conference papers should mention the *name of author(s), title of the paper, name of the conference, place in which the conference was held and date, month and year of* the conference along with *the page numbers of the paper in the proceedings* of the conference.
Example:
Bgfrd M M, Swerft A J, Abqwesd T S : A fuzzy complement edge operator, IEEE Proceedings of the 14th Int. Conf. on Advanced Computing and Communications ADCOM 2006, Mangalore, Karnataka, India, 20-23 Dec., 2006, pp 344-348.

References to books should contain name *of the author, title of the book, name of the publisher, edition number, and year of publication.* If possible ISBN Number also can be quoted.
Example
Griffths and Manuel: Introduction to Neuro-fuzzy Systems, Prentice Hall Inc, Edition 2, 1998.

Reference to web sites can be given as follows:

Example
http://www.freefoto.com : 'Freefoto.com – Free Pictures'.

Appendices
If there is material that if included in the body of the report would break up the flow of reading or bore the reader unbearably, it is better to include it as an appendix. Some items which are typically included in appendices are: major derivations or theoretical developments, important and original computer programs, data files that are too large to be represented simply in the results chapters, pictures or diagrams of results which are not important enough to keep in the main text etc.

General Notes:
-Single column format and print only on one side.
-Use 1.5 spacing for the continuous text.
-Minimum margin:- Binding side –30 mm and 24mm on all other sides
-Full justification of all texts
-Ensure that each new paragraph is clearly indicated.
-Ensure that each new section head is separated by a double space.
-Use 12 pt font Times New Roman for the continuous text (except headings) in MS Word
-Chapter/section headings shall be as per the fonts shown in the sample report structure
-All chapters to be started on a fresh page
-Follow internationally accepted symbols, rules and conventions
-Use the Int. system of units (SI). If other quantities are mentioned, give their eqvnt. in SI units

Suggested Font sizes and margins

Details	Font Type	Font size	Spacing
Facing page (cover and first page)	Times New Roman	14pt bold capitals	Centered (Adjustable spacing)
Chapter headings with chapter number on top	Times New Roman	14pt bold capitals	Centered
Section headings	Times New Roman	12pt bold capitals	Left adjusted
Subsection headings	Times New Roman	12pt sentence case	Left adjusted
Paragraph headings	Times New Roman	12pt bold sentence case	Left adjusted
Body of the report	Times New Roman	12pt	Adjusted on both left and right and with 1.5 spacing for text and double spacing for equations
Left Margin			1.5 inch to accommodate binding area
Right Margin			1.0 inch
Top Margin			2.0 inch on pages on which chapter begins and 1.0 inch on other pages
Bottom Margin			1.25 inch

A sample structure of the project report is given below

B.Tech Project Report

AN EDGE DETECTION SCHEME FOR COLOUR IMAGES

Submitted in partial fulfillment for the award of the Degree of
Bachelor of Technology in Computer Science and Engineering

Submitted by

ABCD (*Roll No.*8005)
EFGH (*Roll No.*8034)
ABED (*Roll No.*8057)

List all students , Roll no one by one

Under the guidance of

Mr/Ms/Dr XYMNL

Institute Emblem

Department of Computer Science and Engineering
T.K.M. COLLEGE OF ENGINEERING, KOLLAM
KERALA

MARCH 2009

CERTIFICATE

Institute Emblem

This is to certify that the thesis entitled "AN EDGE DETECTION SCHEME FOR COLOUR IMAGES" is a bonafide record of the major project done by **ABCD** (*Roll No.*8005), **EFGH** *(Roll No. 8034)* and **ABED** *(Roll No. 8057)* under my supervision and guidance, in partial fulfillment for the award of Degree of Bachelor of Technology in Computer Science and Engineering from the University of Kerala for the year 2009.

If there is more than one guide, write side by side and provide space for HOD's signature at the bottom

Provide Correct Name & designation

Mr/Ms/Dr XYMNL
(Guide)
Asst. Professor
Dept. of Computer Science & Engineering

Provide Correct Name & designation

Mr/Ms/Dr PQRX
Professor & Head
Dept. of Computer Science & Engineering

Place:
Date:

This is only a format. Sentences can be changed as per students' requirement

ACKNOWLEDGEMENT

First and foremost, we wish to place on records our ardent and earnest gratitude to our project guide Mr/Ms/Dr XYMNL**,** *Assistant Professor*, *Dept. of computer Science and Engineering*. His tutelage and guidance was the leading factor in translating our efforts to fruition. His prudent and perspective vision has shown light on our trail to triumph.

We are extremely happy to mention a great word of gratitude to Prof**. Khalid M,** Head of the Department of Computer Science and Engineering for providing us with all facilities for the completion of this work.

Finally yet importantly, we would like to express our gratitude to our project coordinator Mr/Ms/Dr **YZXVH** for his/her valuable assistance provided during the course of the project.

We would also extend our gratefulness to all the staff members in the Department. We also thank all our friends and well-wishers who greatly helped us in our endeavour.

ABCD, EFGH, ABED

List name of all students

One page, self contained. Highlighting significance, objectives, methods adopted, contributions, achievements, applications etc

ABSTRACT

Edge detection process for colour images is an important research issue. Typically, a colour image ----------

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In this project, ----------an attempt has been made --------

---------- using the moment preserving thresholding technique.

This scheme locates the edge boundaries ---------- ----------

---------- such as data hiding and image watermarking.

CONTENTS

Only this framework to be followed

Appendix only, If required. Computer codes (developed for the project if any, lengthy derivations, explanations/details of some already existing algorithms, formulations used in the thesis shall be given in the appendices.

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List of Abbreviations

RMSE	– Root Mean Square Value
PSNR	– Peak Signal to Noise Ratio
ELTSV	– Edge Location To Sub-pixel Values
BD	– Bit Difference
CED	– Canny Edge Detector
GT	– Ground Truth
MAE	– Mean Absolute Error
FOM	– Figure of Merit

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CHAPTER 1
INTRODUCTION

Edge detection is a fundamental task in image processing and computer vision. It has been broadly covered and documented since the early stage of image processing studies. Its importance arises from the fact that edges are considered as important features for analyzing the most important information contained in images, leading ---------- ---------- classification of objects in an image.

1.1 Introduction

There are many different methods for edge detection [1], such as Sobel filtering, Prewitt filtering, ----------, but some common problems of these methods are ----------.

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