B.TECH DEGREE COURSE IN ELECTRONICS & BIOMEDICAL ENGINEERING

SCHEME OF EXAMINATIONS & SYLLABUS
I - VIII SEMESTERS
(With effect from 2012 Admission onwards)
### B.TECH DEGREE COURSE IN ELECTRONICS & BIOMEDICAL ENGINEERING

**SCHEME OF EXAMINATIONS (2012 ADMISSION ONWARDS)**

**SEMESTER I & II (Common to all branches)**

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*1 hour/week each for Environmental Studies and Technical Communication.*
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**EB 1606 E Elective-I**

- EB 1606 E1  Artificial Neural Networks
- EB 1606 E2  Computer Communications
- EB 1606 E3  Digital System Design
- EB 1606 E4  BioMEMS and Nanotechnology
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**EB 1705 E Elective-II**

- EB 1705 E1 Modeling of Physiological Systems
- EB 1705 E2 Biostatistics and Design of Experiments
- EB 1705 E3 Embedded Systems and Applications
- EB/EC 1705 E4 Mechatronics

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**EB 1804 E Elective-III**

- EB 1804 E1 Telemedicine
- EB 1804 E2 Bioinformatics
- EB 1804 E3 Computer Graphics and Volume Visualization
- EB 1804 E4 VLSI Design
B.TECH DEGREE COURSE IN ELECTRONICS & BIOMEDICAL ENGINEERING

SYLLABUS 1 - VIII SEMESTERS
(2012 ADMISSION ONWARDS)
SEMESTER I & II

1101 ENGINEERING MATHEMATICS-I

Module I
Ordinary differential equations: First order differential equations - exact differential equations, Bernoulli’s equations-- Methods of solution and Simple applications.
Linear differential equations of higher orders with constant co-efficients-Methods of solution of these equations.

Module II
Infinite series: Integral test, comparison test, ratio test, Cauchy’s root test, Raabe’s test, seies of positive and negative terms, concept of absolute convergence, alternating series, Leibniz test(No proofs for any of the above tests)
Power series: Taylor and Maclaurin series of functions, Leibniz formula for the nth derivative of the product of two functions (No proof),use of Leibniz formula for the determination of co-efficients of the power series.

Module III
Partial differentiation: Partial differentiation-Concept of partial derivative - Chain rule- Total derivative- Euler’s theorem for homogeneous functions, Differentials and their applications in errors and approximations, Jacobians - Maxima minima of functions of two variables(Proof of the result not required)-Simple applications.
Co-ordinate systems: Rectangular co-ordinates-Polar co-ordinates-In plane and in Space-Cylindrical polar co-ordinates-Spherical polar co-ordinates.

Module IV
Integral calculus:
Application of definite integrals: Area, Volume, Arc length, Surface area.
Applications of multiple integrals. Plane Area, Surface area &Volumes of solids

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
1102 ENGINEERING PHYSICS

Module 1

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


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

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

Shape memory alloys- Shape memory effect, pseudo elasticity.

Module III
Introduction to nanoscale science and technology- nanostructures-nanoring, nanorod, nanoparticle, nanoshells- Properties of nanoparticles- optical, electrical, magnetic, mechanical properties and quantum confinement- Classification of nanomaterials- C60, metallic nanocomposites and polymer nanocomposites-Applications of nanotechnology.


Module IV
Quantum mechanics-Introduction-origin of quantum theory-black body radiation and photo electric effect (brief ideas only)-matter waves- wave packet-uncertainty principle-(two forms)Time dependent Shrodinger equation for a free particle-Particle in force field and time dependent Schrodinger equation-Time independent schrodinger equation-Physical interepretation of wave function-application -Particle in a Box (one dimensional) –Energy eigen values and wave functions

Ultrasonics-piezo electric effect-Magnetostrection effect-production of ultrasonics-properties of ultrasonics- ultrasonic dffractometer and determination of velocity of ultrasonics in a liquid-Application of ultrasonics in non destructive testing - Acoustics of building-reverberation- Absorption Coefficient- Sabines formula for reverberation time(Derivation)- Accoustic intensity- loudness-decibel-phon-conditions for good acoustics(Qualitative study).

References:
2. M.C. Santosh Kumar, Engineering Physics, Nalpat Publishers.
7. G.S. Raghuvarshni, Engineering Physics, Prentice Hall of India.

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x15 = 60 marks)
Module I

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

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

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

Module II

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


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

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

Module III

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

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

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

Module IV

**Engineering materials**:  

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

Refractories: Classification – Properties of refractories.  


References:


**Type of Questions for University Exam.**  
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)  
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
A) STATICS

Module I
Parallel forces in a plane: Two parallel forces. General case of parallel forces in a plane. Centre of parallel forces and centre of gravity, Pappus theorems, centroids of composite plane figures and curves. Distributed forces in a plane.

Module II

B) DYNAMICS

Module III

Module IV

References:

Type of Questions for University Exam,
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Introduction to engineering graphics. Drawing instruments and their use, familiarisation with current Indian Standard Code of Practice for general engineering drawing.
Scales- plain scale, vernier scale, diagonal scale.
Conic sections- Construction of ellipse, parabola, hyperbola - construction of cycloid, involute, archimedian spiral and logarithmic spiral- drawing tangents and normals to these curves.

Module II
Introduction to orthographic projections- plane of projection- principles of first angle and third angle projections, projection of points in different quadrants.
Orthographic projection of straight lines parallel to one plane and inclined to the other plane- straight lines inclined to both the planes- true length and inclination of lines with reference planes- traces of lines.
Projection of plane laminae of geometrical shapes in oblique positions.

Module III
Projection of polyhedra and solids of revolution- frustum, projection of solids with axis parallel to one plane and parallel or perpendicular to other plane- projection of solids with axis inclined to both the planes- projection of solids on auxiliary planes.
Section of solids by planes inclined to horizontal or vertical planes- true shape of sections.

Module IV
Development of surface of cubes, prisms, cylinders, pyramids and cones
Intersection of surfaces- methods of determining lines of intersection - intersection of prism in prism and cylinder in cylinder.

Module V
Introduction to isometric projection- isometric scales, isometric views- isometric projections of prisms, pyramids, cylinders, cones and spheres.
Introduction to perspective projections: visual ray method and vanishing point method- perspective of circles-perspective views of prisms and pyramids.

References:
1. K.C. John, Engineering Graphics, PHI Learning
3. N.D. Bhat, Elementary Engineering Drawing, Charotar publishing house
4. P.S. Gill, Geometric Drawing, B.D Kataria & Sons, Ludhiana

University Examination Question Paper pattern
Two questions of 20 marks each from all the five modules. Answer one question from each module. (5x20 = 100 marks)
1106 BASIC CIVIL AND MECHANICAL ENGINEERING

PART- A BASIC CIVIL ENGINEERING

Module I
Aggregates- types & requirements. Concrete- grades of concrete as per IS code, water cement ratio, workability, mixing, batching, placing, compaction and curing.
Construction: Foundation- types of foundations- isolated footing, combined footing, raft, pile & well foundations- Foundation for Machinery

Module -II
Super structure: Brick masonry, English bond and Flemish bond, Stone masonry-Ashlar masonry- Rubble masonry. Roofing- Steel trusses, roofing for industrial buildings
Surveying: Principles, instruments, ranging and chaining of survey lines, errors in chaining, field work, field book, selection of survey stations, reconnaissance.
Leveling: Leveling instruments, different types, temporary adjustments, mean sea level, reduced level of point, booking of field notes, reduction of levels by height of collimation method.

References:
2. Roy M. Thomas, Fundamentals of Civil Engineering, Educational Publishers,Ernakulam
5. P. Kanetkar, Surveying and Levelling, Volumes 1 and 2, United Book Corporation, Poona.

PART A - Type of Questions for University Exam. (Maximum Marks: 50) (To be answered in separate answer book)
Q 1. Four short answer questions of 5 marks each with two questions from each module. (4x5 = 20 marks)
Q 2 to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (2 x 15 = 30 marks)

PART- B BASIC MECHANICAL ENGINEERING

Module I
Thermodynamics: Thermodynamics systems – open, closed and isolated systems, equilibrium state of a system, property and state, process, cycle, Zeroth law of thermodynamics- concept of temperature, temperature scales. First law – internal energy, enthalpy, work and heat, Different processes, isobaric, isochoric, isothermal and adiabatic processes Second law – Kelvin-plank and Clausius statements, Carnot Cycle.
Internal Combustion Engines: Air standard cycles – Otto and Diesel cycles, working of two stroke and four stroke Petrol and Diesel engines, Carburatted and MPFI engines, fuel pump, fuel injector, ignition system, cooling system, lubricating system.

Module II
Refrigeration and Air conditioning: Vapour compression and vapour absorption refrigeration systems, summer, winter and comfort air conditioning.
Manufacturing processes – Casting (sand and die casting processes), Forging (open &closed die forging), Rolling, Extrusion, Welding (resistance, arc and gas), brazing and soldering
Elementary ideas of simple reaction and impulse turbines, compounding of turbines.
Transmission of power: Belt drives (open and closed), Chain drives.

References:
2. J.P. Holman, Thermodynamics, Mc Graw Hill
3. Rogowsky, Elements of Internal combustion Engines, Tata McGraw Hill
5. Stoecker, Refrigeration and Air Conditioning, Tata McGraw Hill
6. Raghavan : Material Science and Engineering, Prentice Hall of India

PART B - Type of Questions for University Exam. (Maximum Marks: 50) (To be answered in separate answer book)
Q 1. Four short answer questions of 5 marks each with two questions from each module. (4x5 = 20 marks)
Q 2 to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (2 x 15 = 30 marks)
1107 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(A) ELECTRICAL ENGINEERING

Module I
Capacitors: The Electric Field – Capacitance – Capacitors.
Inductors: Magnetic Field – Inductance.

Module II
The Basic Elements and Phasors: Response of Basic R.L and C Elements to a Sinusoidal Voltage or Current – Frequency Response of the Basic Elements – Average Power and Power Factor – Complex Numbers – Rectangular Form – Polar Form – Conversion between Forms.
Introduction to 3 phase Systems: StarΔ Connection

(B) ELECTRONICS ENGINEERING

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

Module IV
Sensors-Temperature, light, force and sound sensors; Actuators – Heat, Light, force and sound actuators.
Electronic measurements - measurements of voltages and currents, voltmeter, ammeter, multimeter, CRO (Block level treatment only)
Introduction to Electronic Communication Systems: Modulation and Demodulation, Analog communication system, Electromagnetic frequency spectrum, Bandwidth and information capacity, Principles of Amplitude and angle modulation, Bandwidth requirements of angle modulated waves.
Optical communication: Fundamental concepts, Block diagram of an optical fibre communications system.
Cellular Telephone: Fundamental concepts, Frequency reuse, Block diagram of a simplified cellular telephone system, Roaming and handoffs
Satellite communication: Block diagram of Satellite system link models – Uplink, Transponder Downlink.

References:
Type of Questions for University Exam,
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I


**Problem Solving Methodology**: Program - Programming Process (Problem statement, Analysis, Design a solution, Implement/Coding the solution, Test the solution, Iteration through the phases to refine/correct the program) - Design tools (Algorithm, Flow-chart, Pseudo-code) - Develop algorithms for simple problems.

Module II

**Programming Languages**: Types and generation of programming languages - Compiler – Interpreter-Linker –Loader – Execution of Program

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

Module III

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

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

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

Module IV

**User defined data types**: Structure – Union - Enumerated data type - Programs involving structure and union.

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

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

References:
2. Samarjit Ghosh. All of C; PHI Learning
5. R G Dromey , How to solve it by Computer, Prentice Hall
8. Sukhendu Dey, Complete Knowledge in C, Narosa
9. Varghese Paul, Computer Fundamentals, EPD.

Type of Questions for University Exam.

Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Natural resources - issues related to the use and over exploitation of forest resources, water resources, mineral resources, food resources, energy resources and land resources- role of an individual in conservation of natural resources - equitable use of resources for sustainable life styles.

Concept of an ecosystem - structure and function - energy flow in the ecosystem - ecological succession - food chains, food webs and ecological pyramids - structure and functions of a forest ecosystem and an aquatic eco system.

Definition of biodiversity - genetic, species and ecosystem diversity - biogeographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Threats to biodiversity, Conservation of biodiversity.

Module II

Environmental Pollution - Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, marine pollution, thermal pollution and nuclear hazards - Causes, effects and control measures of urban and industrial solid wastes -Role of an individual in prevention of pollution - An overview of the various environmental legislations in India - Issues involved in enforcement of environmental legislation. Disaster Management: Floods, earth quake, cyclone and landslides. Role of public awareness in disaster management.


References:
2. Erach Bharucha, Textbook of Environmental Studies and Ethics, Universities Press (India), Hyderabad, 2005.

PART - B TECHNICAL COMMUNICATION (1 hour/ week)

This is a practice oriented, need based, and functional – communicative course. It is intended to develop the student’s skill of communication in listening, speaking, reading and writing. The student is advised to cultivate the habit of reading newspapers, magazines and books in a free, extensive manner to consolidate the skill already achieved. A more inter-active process of teaching/learning is called for in order to achieve effective communication.

Questions at the class tests and semester end examination will be largely problem solving and application oriented in nature.

Module I

Communicative Grammar: Time, tense and aspect; Verbs of state and event; Use of preposition; Expressing emotions and attitudes: Hope, anticipation of pleasure, disappointment, approval, disapproval, surprise.

The sounds of English: (it is not a course in phonetics. Technical terms will not be used except when absolutely necessary.)

Length of vowels-long and short vowels

\[
/\text{i}/, /\text{e}/, /\text{a}/, /\text{e}/, /\text{u}/, /\text{u}/, /\text{\AA}/, /\text{o}/, /\text{o}/, /\text{\U}/, /\text{\U}/\]

- Consonants: /f, v, o, o, z, 3/ - Stress pattern -

- Intonation: failing and rising.

Oral Communication: starting and ending a conversation; telling and asking people to do things; expressing opinions and ideas, decisions and intentions, offers and invitations, feelings, right and wrong, numbers and money.
Purpose and audience; dealing with customers and clients; face-to-face discussions; interviews; group discussions; meetings and attending meetings; checking understanding; raising questions; giving and receiving feedback; using body language; leading and directing discussions; concluding discussions; using graphics in oral presentations

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

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

**Module II**

**Written Communication:** note making and note taking; summarizing; notes and memos; developing notes into text; organization of ideas: cohesion and coherence; Preparing notes – writing business letters and E-mail messages.

Organizing a meeting, preparing an agenda, chairing a meeting, drafting motions and resolutions, writing minutes.

Paragraph writing: Paragraph writing – Topic sentence, cohesion and coherence- sentence liners (so, but, however etc), ordering information in space and time; short essays: description and argument; comparison and contrast; illustration; using graphics in writing: tables and charts; diagrams and flow-charts; maps, plans and graphs.

Preparation of a business report-writing a business proposal - format, length, structure.

Spelling rules and tips; writing a rough draft; editing and proof reading; writing the final draft; styling text; filling in complex forms; standard letters; Writing a curriculum vitae (both chronological & functional) along with an application for a job; Public relation – Concept and relevance – PR in a business organization-handing the media; writing a report; writing leaflets and brochures; writing references; essay writing: expository writing; description of processes and products; classification; the instructional process; arguments and presentation of arguments; narrating events chronologically.

**References:**


**University Examination Pattern**

The question paper will have two parts. Part A and Part B will have a weightage of 50 marks each and they will have to be answered in separate answer books.

**Question Paper Pattern for Part A (Environmental Studies)**

Q I. – 6 short type questions of 3 marks each, with three questions from each module. (6 x 3 = 18 marks)
Q II. – 2 questions A and B of 16 marks from Module I with choice to answer one. Both A and B should have a minimum of two sub – sections. (1 x 16 = 16 marks)
Q III. - 2 questions A and B of 16 marks from Module II with choice to answer one. Both A and B should have a minimum of two sub – sections. (1 x 16 = 16 marks)

**Question Paper Pattern for Part B (Technical Communication)**

Q I. – 10 short answer questions of 2 marks each, with five questions from each module. The questions shall be problem solving and application oriented in nature. (10 x 2 = 20 marks)
Q II. – 2 questions A and B of 15 marks from Module I with choice to answer one. Both A and B should have a minimum of two sub – sections. The questions shall be problem solving and application oriented in nature. (1 x 15 = 15 marks)
Q III. - 2 questions A and B of 15 marks from Module II with choice to answer one. Both A and B should have a minimum of two sub – sections. The questions shall be problem solving and application oriented in nature. (1 x 15 = 15 marks)
ELECTRICAL WORKSHOP

1. One lamp controlled by one switch
2. Series and parallel connections of lamps.
3. Stair case wiring.
4. Hospital Wiring.
5. Godown wiring.
6. Fluroscent lamp.
7. Connection of plug socket.
8. Different kinds of joints.
10. Soldering practice.
11. Familiarisation of CRO.

MECHANICAL WORKSHOP

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

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

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

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

**Spread Sheet**
3. To create a spread sheet to analyze the marks of the students of a class and also to create appropriate charts.

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

## C Programming Basics

**Operators & Expressions**
5. To write a simple menu driven calculator program using switch statement

**IO Formatting**
6. To write a program to print Pascal’s triangle.

**Decision Making**
7. To write a program for electricity bill preparation.

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

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

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

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

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

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

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

*Note: 50% marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50% marks in the aggregate and 50% minimum in the end semester examination for a pass.*
11 L3 LANGUAGE LABORATORY

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

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

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

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
5. ‘Just A Minute’ Sessions (JAM).
6. Describing Objects / Situations / People.
7. Information Transfer
8. Debate
10. Giving Directions.

Note: 50% marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50% marks in the aggregate and 50% minimum in the end semester examination for a pass.
SEMESTER III
CE/CS/EB/EC/EE/EI/FT/IT/ME/SE 1301 ENGINEERING MATHEMATICS - II

Module I
Matrices and Vector spaces: Rank of matrix, Echelon and normal form, Solutions of linear systems of algebraic equations, Eigen values and Eigen vectors, Cayley Hamilton theorem (non proof).
Vector Spaces – Subspaces, Linear Independence of vectors, Linear span, Dimension and Basis. Linear transformations.

Module II
Fourier series and Fourier integrals: Fourier series of Periodic functions, Euler formulae for Fourier coefficients, functions having period 2π, arbitrary period-even and odd functions-half range expansions, Fourier integral, Fourier cosine and sine transformations, linearity property, transform of derivatives, convolution theorem (no proof)

Module III
Laplace transforms: Linearity property, transforms of elementary functions, Laplace transforms of derivatives and integrals, differentiation and integration of transforms, convolution theorem (no proof) use of Laplace transforms in the solution of initial value problems, unit step function, impulse function - transform of step functions, transforms of periodic functions.

Module IV
Vector calculus: Scalar and Vector point functions - Gradient and directional derivative of a scalar point function, Divergence and Curl of a vector point functions - their physical meanings. Evaluation of line integral, surface integral and volume integrals, Gauss’s divergence theorem, Stoke’s theorem (No Proof of these theorem), conservative force fields, scalar potential.

References:
3. Larry C Andrews, Ronald C Philips, Mathematical Techniques for Engineers & Scientists, PHI Publishers

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
*Generation, transmission & distribution of electrical energy:* Different methods of power generation - thermal, hydro-electric and nuclear (general idea only). *Transformers:* Working principle and elementary theory of an ideal transformer, Constructional features of single phase transformer, emf equation, turns ratio, vector diagram, equivalent circuit, impedance transformation, transformer losses, flux leakage, efficiency, open circuit and short circuit test, load test. Auto transformer - working principle, basic idea of current transformer and potential transformer.

Module II
*Basic principles of electrical machines:* Concepts of motoring and generating action. *DC machines:* Main constructional features, principles of operation, types of generators, emf equation, characteristics, applications, armature reaction and commutation, types of motors, torque, speed, and power, characteristics, applications, starting, losses and efficiency, speed control, testing, load test of dc machines.

Module III
*AC Machines: Alternator-* rotating field, speed and frequency, effect of distribution of winding, coil span, emf equation, regulation (emf method only), applications, Synchronous motor-* principle of operation, over excited and under excited, starting, applications. *Induction Motor:* Three phase induction motor - principles of operation, constructional features of squirrel cage and slip ring motors, torque-slip characteristics, starting, speed control, losses and efficiency. Single phase induction motor – Double field revolving theory, making single phase induction motor self starting-split phase and capacitor start induction run. *Special Motors:* Construction, principle of operation and applications of BLDC, Stepper Motor and PMSM.

Module IV

**References:**

**Type of Questions for University Exam.**
*Q 1.* Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
*Q 2.* to *Q 5.* Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I


General awareness of common diseases associated with the each system (detailed study not required).

Module II

Nervous system - Organization - Structure of neuron, nerve centres - cerebrum, cerebellum, thalamus, hypothalamus, brainstem and spinal cord, nerves - cranial and spinal. Autonomic nervous system. Central nervous system - receptors, ascending tracts and descending tracts, sensory perception with special reference to touch, heat, pain, muscle tone, regulation of posture and equilibrium. Special senses - organs of vision, hearing, taste & smell - mechanisms of each. Endocrine system - Functions of major endocrine glands and their hormones - Pituitary, thyroid and parathyroid, adrenocortical, insulin, glucagon, hormones of the male and female reproductive systems.

General awareness of common diseases associated with the each system (detailed study not required).

Module III


General awareness of common diseases associated with the each system (detailed study not required).

Module IV

Respiratory system - concepts of organs concerned with the respiration and their structure and organization - Mechanics of respiration, physical principles of gaseous exchange, transport of gases and control of respiration, lung volumes & capacities. Cardiovascular system - Heart - Structure of heart and major blood vessels, rhythmic excitation of heart - cardiac cycle - ECG, heart rate, heart sounds & phonocardiogram cardiac outputs. Circulatory system - systemic circulation and pulmonary circulation, blood pressure, arterial pulse, blood flow, measurement of blood flow & blood pressure. Blood - The composition of blood, functions, blood groups, lymphatic systems, reticuloendothelial system & defence mechanism of the body - Infection and immunity.

General awareness of common diseases associated with the each system (detailed study not required).

References:


Type of Questions for University Exam.

Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)

Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
EB/EC 1304 DIGITAL ELECTRONICS

Module I
Number system and codes: Binary, Octal, and Hexa-decimal number systems - Binary arithmetic. Binary coded Decimal, Excess - 3 code, Gray Code, Error detection and correction: Parity, CRC, 7 bit Hamming code.

Boolean algebra -Minimization of Boolean function using Karnaugh Map (upto 6 variables) and Quine - McClusky methods – Formation of switching functions from word statements, realization using basic gates and universal gates.

Module II

Module III

Module IV
Logic families: Standard logic levels - Current and voltage parameters - fan in and fan out - Propagation delay, noise consideration. Basic idea of DCTL, RTL and DTL families. TTL family NAND gate working principle, need for totem pole configuration, TTL inverter characteristics, Open collector gate and tri-state logic gate. CMOS: characteristics of basic CMOS inverter - interfacing of CMOS to TTL and interfacing of TTL to CMOS, Merits and demerits of TTL family and CMOS family. ECL family OR-NOR gate working principle.

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Radioactivity - Units - radio emission - law of radioactive decay, half life period - production of radio isotopes for medical use, Production of x rays – discharge tube and Coolidge tube method, x-ray spectra – continuous and line spectra, factors determining the x-ray emission, Efficiency of x ray production, distribution of x-rays in space. Radiation units - detection and measurements of x-rays.

Module II

Module III

Module IV

References:

Type of Questions for University Exam,
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
DC power supplies - power transformers - rectification - half wave, full wave, bridge - expression for ripple factor, efficiency, comparison, diode ratings. filters - capacitor - inductor LC filters- use of bleeder resistor - voltage multipliers - dual power supplies - zener and avalanche diodes - simple and series voltage regulator. Special semiconductor devices: Principles and operation of photodiodes, PIN diodes, phototransistors, LED, UJT. MOSFET - enhancement & depletion types - NMOS, PMOS & CMOS - basic principles & characteristics.

Module II

Module III
Power amplifier - classification - class A, B, AB and C power amplifiers-tuned amplifier- push-pull and complementary symmetry power amplifier –Harmonic distortion – Heat sinks. Feedback amplifiers: concept of Negative and positive feedback – Bark Hausen criteria -low frequency sinusoidal oscillators
High frequency oscillators – types- LC, Crystal oscillators –circuit diagram-description-applications

Module IV
Pulse Circuits:-Different types Pulse circuits - pulse characteristics - Pulse shaping using RC circuits - Differentiating and integrating circuits –applications. Clipping and clamping circuits using diodes - Transistor as a switch– simple sweep circuits-bootstrap sweep. Multivibrators-astable, monostable and bistable circuits using BJTs-applications

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
1. Study of - Multimeters, Signal generators & CRO and measurement of electrical quantities (Voltage, Current, Frequency & Phase)
2. Testing of Passive and Active components - Resistors, Capacitors, Inductors, Transformers, Diodes, Transistors, etc.
3. Characteristics of Active devices
   i) Characteristics of diodes – Si & Ge diodes, zener diode & LED.
   ii) Characteristics of transistors - CE & CB
4. Rectifying circuits
   i) HW rectifier   ii) Centre tapped FW rectifier   iii) FW Bridge rectifier
   iv) Filter circuits - Capacitor filter, inductor filter and Pi section filter
5. Biasing of BJT - Voltage, current and feedback biasing
7. Design of power supplies.

Note: 50% marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50% marks in the aggregate and 50% minimum in the end semester examination for a pass.
EB 13 L2 ELECTRICAL MACHINES LABORATORY

**Compulsory experiments**

1. (a) Preliminary study of AC and DC Power supplies in the laboratory.
   (b) Study of instruments and their mode of use

2. Open circuit characteristics of
   (a) Self excited generator
   (b) Separately excited generator.

3. Load characteristic of compound generator

4. Load characteristic of shunt generator

5. Study of face plate starter and starting of DC motors


7. Swinburn’s test

8. Polarity and transformation ratio test on single phase transfer.

9. O.C & SC test on single phase transformer - equivalent circuit

10. Load test on single phase transformer.

11. Study of starting methods of squirrel cage and slip ring induction motor.

12. Load test on slip ring induction motor and study of characteristics.

**Optional Experiments**

1. Study of single-phase motors.

2. Load test of DC shunt motor.

3. Poly phase connection of single phase transformer.

4. Load test on squirrel cage induction motor

5. Study of alternators.

**Note:** 50% marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50% marks in the aggregate and 50% minimum in the end semester examination for a pass.
SEMESTER IV
CE/CS/EB/EC/EE/EI/FT/IT/ME/SE 1401 ENGINEERING MATHEMATICS-III

Module I
Complex Analytic functions and conformal mapping: curves and regions in the complex plane, complex functions, limit, derivative, analytic function, Cauchy – Riemann equations, Elementary complex functions such as powers, exponential function, logarithmic, trigonometric and hyperbolic functions.
Conformal mapping: Linear fractional transformations, mapping by elementary function like $Z^2$, $e^z$, $\sin z$, $\cos z$, $\sinh z$, and $\cosh z$, $Z + 1/Z$

Module II
Complex integration: Line integral, Cauchy’s integral theorem, Cauchy’s integral formula, Taylor’s series, Laurent’s series, residue theorem, evaluation of real integrals using integration around unit circle, around the semi circle, integrating contours having poles, on the real axis.

Module III
Partial differential equations:
Formulation of partial differential equations.
Solutions of equations of the form $F(p,q) = 0$, $F(x,p,q) = 0$, $F(z,p,q) = 0$, $F_1(x,p) = F_2(y,q)$, Lagrange’s form $Pp+Qq = R$
Linear homogeneous partial differential equations with constant co-efficient

Module IV
Vibrating string: one dimensional wave equation, D’Alembert’s solution, solution by the method of separation of variables
One dimensional heat equation, solution of the equation by the method of separation of variables,
Solutions of Laplace’s equation over a rectangular region and a circular region by the method of separation of variables.

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
CS/EB 1402 MICROPROCESSORS

Module I
Introduction to 8 bit microprocessor: Microcomputers and microprocessors, 8/16/32/64-bit microprocessor families; Internal architecture of Intel 8085 microprocessor: Block diagram, Registers, Internal Bus Organization, Functional details of pins, Control signals, External Address/Data bus multiplexing, Demultiplexing, I/O mapped I/O, and memory mapped I/O techniques. Interrupts, Serial communication and DMA features.

Module II
Assembly Language Programming: 8085 instruction set: Instructions, Classifications, Addressing modes, Stack and Subroutines, Delay routines, Counters etc. Programming examples.

Module III
Instruction Timing and Interrupts: Timing Diagrams (of various instructions): T-state, Machine cycle (Opcode fetch, Read/Write, Interrupt Acknowledge, Bus Idle, etc), Interrupts: -types (h/w and s/w), Maskable/Non maskable, their organization.

Module IV
Interfacing concepts and devices: Memory interface: Concept of memory chip/chips interface to 8085 with appropriate examples Programmable interfacing devices: - Programmable peripheral interface (Intel 8255), Programmable timer interface (Intel 8253/5), Programmable display/Keyboard interface (Intel 8279), Programmable serial communication interface (Intel 8251)-(their architecture, register organization, initialization, hardware and software interface to 8085.

References:
5. Ghosh and Sridhar, 0000 to 8085 Microprocessors for Engineers and Scientists, PHI, 2nd ed.

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III

Module IV
Specialized ICs and applications: IC regulators - 723 (block diagram, typical low voltage regulator circuit), 78XX, 79XX, 317 - applications. Timers - 555 – Functional block diagram- Astable and monostable multivibrators using 555 - applications. VCO – 566. PLL - Block diagram and derivation of capture range, lock range and pull in time capture and lock range - 565 – applications.

References:
2. Sergio Franco, Design with operational Amplifiers & Analog ICs, Tata McGraw Hill.1998
9. D A Bel, Opamps and Linear integrated Circuits, Prentice Hall of India.

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II
Electrical activity of the heart: Cardiac muscle, Action potentials in cardiac muscle, SA node, Origin and propagation of rhythmical excitation & contraction, refractoriness, regular and ectopic pace makers, electrocardiogram – lead systems - waveforms and their significance – ECG in diagnosis – Arrhythmias, abnormal rhythms, heart blocks, premature contractions, flutter, fibrillation, vulnerable period.

Module III

Module IV
Electrical activity of muscles – neuromuscular junction, synaptic potentials, motor unit, motor unit action potentials, Electromyogram, Electroneurogram – nerve conduction studies.
Electrodes for measurement of biopotentials– Types, Recording and stimulating electrodes, electrode-tissue interfaces – electrode-electrolyte and electrolyte-skin interfaces, Polarizable and non polarizable electrodes - Silver-silver chloride electrodes, skin contact impedance.

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III

Module IV
Introduction to digital communication: Emergence of data communication systems – characteristics – digital codes – error detection and correction – constant ratio codes, redundant codes, parity check codes, rate transmission, forward error correcting codes. Data sets and interconnection requirements – Modems – classification, modes of operation, modem interconnection, modem data transmission speed – modem interfacing.

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Power transistors: Structure and characteristics, Parallel operation of transistors, Switching and amplification applications, Power MOSFET: Structure and characteristics.

Thyristors- Classification, SCR: Working principle, V – I, turn on, turn off and gate characteristics, ratings, Series and parallel operation of SCRs, Trigger circuits- half- wave and full-wave operation, Thyristor protection - over current, over voltage, di/dt, dv/dt, gate protection. TRIAC : characteristics, modes of operation.

Module II

Single phase controlled rectifiers - half-wave, full-wave, half-controlled and fully controlled - typical waveforms with R, RL, RL with diode and RL with voltage source - voltage and current equation for half-wave controlled rectifier. Three phase half-wave and full-wave controlled rectifier with R load, waveforms. DC motor speed control - various schemes - multiquadrant operation - simple circuits for speed control of series, PM and separately excited motors.

Module III

Commutation schemes - (different classes) waveforms - single-phase invertors - series, parallel and bridge -PWM inverter - square wave and sin wave input. Chopper circuits using SCR/transistor -step up, step down, step up/down (detailed analysis not required) - Jones Chopper. Induction Motor speed control - various schemes for electronic control.

Module IV

Static switches: dc & ac (1φ and 3φ) switches, Solid state relays., Switching regulators - Basic concepts, analysis and design of Buck, Boost and Buck-Boost converters, SMPS - Configuration – Application. UPS - Configuration – Application. Batteries - charging circuit.

Industrial applications: dielectric heating and induction heating.

References:


Type of Questions for University Exam.

Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x15 = 60 marks)
CS/EB 14 L1 DIGITAL ELECTRONICS LABORATORY

1. Study of standard logic gates and universal gates.

2. Arithmetic circuits
   i. Adders & subtractors using standard logic & universal gates.
   ii. Study of 7483 & binary addition & subtraction using 1’s & 2’s complement.
   iii. BCD adder using 7483.

3. Code converters with mode control, Parity generator/checkers.

4. Study of MUX, DEMUX, decoder & encoder circuits & their ICs.


6. Counters
   i. Asynchronous UP, DOWN, UP/DOWN counter using JK Flip flops
   ii. Design and realization of sequence generators.
   iii. Study of IC counters 7490, 7492, 7493 and 74193.

7. Study of shift registers and design of Johnson and Ring counter using it.

8. Study of seven segment display & decoder driver (7447)

9. Astable and monostable multi-vibrators using TTL gates

10. Transfer characteristics and specifications of TTL gates

Note: 50% marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50% marks in the aggregate and 50% minimum in the end semester examination for a pass.
EB 14 L2 ANALOG CIRCUITS LABORATORY-II

1. Clipping and clamping circuits
2. Frequency responses of RC low pass & high pass filters
3. RC differentiating and integrating circuits.
4. RC coupled amplifiers using BJT with and without feedback - gain, frequency response & bandwidth.
5. Oscillators - RC phase shift, Wein Bridge & Crystal oscillators
7. Switch & sweep circuits - Simple transistor sweep, bootstrap sweep.
8. Series & parallel RLC resonant circuits
9. Study of 741 op amp and implementation of basic circuits using 741 – Inverting, non inverting, voltage follower, summing, difference amplifiers, comparators, active high pass & low pass filters, integrator & differentiator.

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

CE/CS/EB/EC/EE/EI/FT/IT/ME/SE 1501 ENGINEERING MATHEMATICS-IV

Module I
Probability distributions: random variables (discrete & continuous), Probability density, mathematical expectation, mean and variance of a probability distribution, binomial distribution, Poisson approximation to the binomial distribution, uniform distribution, normal distribution.
Curve fitting: method of least squares, correlation and regression, lines of regression.

Module II
Sampling distributions: Population and samples, the sampling distribution of the mean unknown (σ known), the sampling distribution of the variance, point estimation, interval estimation, tests of hypotheses, null hypotheses and significance tests, hypothesis concerning one mean, type I and type II errors, hypotheses concerning two means. The estimation of variances: Hypotheses concerning one variance – Hypotheses concerning two variances.

Module III
Finite difference Operators: ▽, Δ, δ, µ, x(n)
Newton’s Forward and Backward differences interpolation polynomials, central differences, Stirlings central differences interpolation polynomial. Lagrange interpolation polynomial, divided differences, Newton’s divided differences interpolation polynomial.
Numerical differentiation: Trapezoidal and Simpson’s rules, compounded rules, errors of interpolation and integration formulae. Gauss quadrature formulae (No derivation for 2 point and 3 point formulae)

Module IV
Numerical solution of boundary value problems: Methods of finite differences, finite difference methods for solving Laplace’s equation in a rectangular region, finite differences methods for solving the wave equation and heat equation.

References:
1. Irvin Miller & Freiend, Probability And Statistics For Engineers, Prentice Hall of India.

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Transducers and sensors: Transducers- sensors- active and passive. Study of biological sensors in human body and their basic mechanism of action - organization of nervous system- neuronal mechanism and circuit processing - Study of various corpuscles like Pacinian - Chemoreceptors, hot and cold receptors, barro receptors, sensors for smell, sound, vision, osmolality and taste.

Module II

Module III
Bio sensors - Ion exchange membrane electrodes- oxygen electrodes- CO2 electrodes enzyme electrode - construction - ISFET for glucose, urea etc. Electrolytic sensors - optical sensor - fiber optic sensors.

Module IV
Transducers: Temperature transducers - thermoresistive transducers, thermoelectric, p-n junction, chemical thermometry. Displacement transducers - potentiometric - resistive strain gauges - inductive displacement - capacitive displacement transducer. Pressure transducer - indirect method - measurement of blood pressure using sphygmomanometer - instrument based on Korotkof sound, strain gauge and LVDT transducers, capacitive and piezoelectric type, catheter tip transducers - measurement of intracranial pressure - catheter tip - implantable type. Transducers for velocity and torque measurements

References:
5. Iberall & Guyton , *Regulation & Control in Physiological System*, Instruments Society USA

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
EB 1503 HOSPITAL ENGINEERING

Module I

Module II
Electrical power systems in hospitals - Design of sub stations, wiring in hospitals, protective systems – over voltage and over current protectors, circuit breakers, Surge protectors, EMI filters, Stabilised and uninterrupted power supply systems - Basics of air conditioning and refrigeration systems- De-odourisation and disinfections and dehumidification

Module III

Module IV
Hospital gas supply systems - Centralized supply of air, nitrous oxide, vacuum & oxygen – principle of production of liquid oxygen. Working of dry, oil free air compressor - small and big vacuum engines. Stretchers & wheel chairs.

References:

For EB 1503 Hospital Engineering course, the assignment shall be an in-plant training (at least one week) in a hospital where the students get familiarized with the administration, functioning & management of the hospital with respect to the topics mentioned in the syllabus. The students shall fix up the hospital for training and prepare a document based on this training and present the details of the training attended during the course.

Type of Questions for University Exam,
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Introduction to biomedical signals—nature—examples ECG, EMG, EEG, PCG, VAG, carotid pulse, speech signal, concurrent signals. Sampling theorem—Discrete time signals and systems—Properties of discrete systems—LTI system convolution—correlation—difference equation representation of discrete systems—The Z transform—properties of Z transform—the inverse Z transform—Transfer function.

Module II

Module III
FIR Digital Filters Realizations—direct—cascade—lattice forms—FIR filter design using Fourier series—use of window functions like rectangular, raised Cosine, Kaiser, Triangular—frequency sampling design—Notch filter—Software implementation of filters.

Module IV

References:
10. Avtar Singh & Srinivas, Digital Signal Processing, Thomson Learning, 2004

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
**General measurement system:** Static characteristics - accuracy, precision, linearity, hysteresis, threshold, dynamic range, calibration, standards. Errors – measurement of errors, error reduction. Dynamic characteristics - Transfer function - first and second order instruments - first and second order response, dynamic errors and dynamic compensation - Loading effect. **Basic principles of test and measuring instruments:** Multimeters - analog and digital, CROs- analog and digital storage oscilloscope. **Basic medical Instrumentation system:** Block diagram – design and performance requirements – constraints in design – types of biomedical equipments – analytical, diagnostic, therapeutic, surgical – manual, microprocessor and PC based equipments – regulation of medical devices and testing of biomedical equipments.

Module II

Module III
**Analytical equipments used in clinical environment:** Beer-Lambert's Law - UV, visible and infra-red spectrophotometers- monochromators, detection systems and amplifiers - basic applications in biochemical analysis. Flame photometers, colorimeters, pH meter, Hb meter - principles and applications.

ModuleIV

References:

*Type of Questions for University Exam.*

Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module 1

Module 2
8086 hardware design: minimum mode and maximum mode configurations, Bus structure, bus buffering, latching, system bus timing with diagram. Peripherals and their interfacing: Dynamic RAM interfacing, interfacing I/O ports, interfacing with Programmable Interrupt Controller 8259, Programmable DMA interface 8237, DMA transfer and operations. Multimicroprocessor Systems: Interconnection topologies-Interconnection of 8087 with the CPU- architecture of 8087 - Design of a PC based multimicroprocessor system

Module 3

Module 4
Introduction to micro controllers - comparison with microprocessors, study of micro controller (MCS 51 family- 8051) - Architecture, instruction set, addressing modes and programming. Interfacing to ADC and DAC using microcontrollers

References:
10. Intel Users manual for 8086, 80386 & 80486, Pentium & Pentium pro

Type of Questions for University Exam,
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
PART I – Programming of 8085 microprocessor (6 Lab sessions)

1. Study of a typical microprocessor trainer kit and its operation.

2. Simple Programming examples using 8085 instruction set to understand the use of various instructions and addressing modes – at least 20 examples including code converters, counters (Up & Down Counters), real time clock.

PART II – Interfacing of peripheral devices to 8085 (5 Lab sessions)

1. Interfacing and programming of 8255.

2. Interfacing and programming of 8279.

3. Interfacing and programming of 8253.

4. A/D and D/A converter interface.

5. Stepper motor interface

PART III – 8086 programming (4 Lab sessions)

1. Introduction to DEBUG program commands

2. Typical examples of assembly language programming using 8086

3. Interfacing of peripheral devices to 8086

Note: 50% marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50% marks in the aggregate and 50% minimum in the end semester examination for a pass.
EB 15 L2 MEDICAL ELECTRONICS LABORATORY-I

1. Bioamplifier, Phase detector, Notch filter
2. Study of IC 555 and its applications
3. Study of IC 4051 and its applications
4. Design of pacemaker circuits & Characterization
   i. Fixed type
   ii. Demand type
5. Digital to analog converter
6. Thermistor characteristics
7. Skin contact impedance
8. Study of LDR & its characteristics
9. ECG filters
10. Study of medical equipments
    i. ECG
    ii. Sphygmomanometer
    iii. Analytical equipments such as colorimeter, pH meter, HB meter

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

EB 1601 MEDICAL IMAGING TECHNIQUES

Module I
Ultra Sound In Medicine - principles of image formation, capture and display - principles of A-mode, B-mode and M-mode displays - Doppler Ultrasound and Colour flow mapping - Applications of diagnostic ultrasound. Introduction to 3D and 4D ultrasound and its applications.

Module II
X-Ray computed tomography - Principles of sectional imaging - scanner configuration - data acquisition system - image formation principles - conversion of x-ray data into scan image - Image reconstruction from projections CT reconstruction - Radon transform-inverse radon transform back projection operator-convolution back projection- parallel beam geometry- Fan beam geometry. 2D image reconstruction techniques - Iteration and Fourier methods. Types of CT scanners – spiral CT, multi slice CT.

Module III
Magnetic Resonance Imaging - principles of image formation, pulse sequence-image acquisition and reconstruction techniques -MRI Fourier reconstruction. MRI instrumentation – magnets – gradient system – RF coils- receiver system – Functional MRI - Application of MRI.

Module IV

References:
8. HH Schild MRI made easy 2003 - Schering AG.

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Spectral analysis, Estimation of power density spectrum, Periodogram - Parametric model based spectral Linear prediction theory, estimation Auto regressive (AR), Moving average (MA) Autoregressive moving average (ARMA) models. Estimation of parameters- spectral error measure EEG analysis.

Module II
ECG data reduction Techniques: Direct ECG data compression- transformation compression – comparison.

Module III
Wavelets Introduction- Continuous wavelet transform, wavelet time-frequency characteristics, Discrete wavelet transform and orthogonal wavelet decomposition, orthonormal wavelets, filter banks-Applications- wavelet de-noising, discontinuity detection, feature detection : wavelet packets ,wavelet compression.

Module IV

References:
1. D C Reddy: Biomedical signal Processing, Tata McGraw-Hill, New Delhi, 2005
4. Rangaraj M Rangayyan: Biomedical Signal Analysis, John Wiley, 2002
5. Avtar Singh, S. Srinivasan Digital Signal Processing Implementations : Using DSP Microprocessors (with examples from TMS320C54XX), Thomson-Engineering 1st Ed.2004

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III
Impedance Techniques : Bipolar and tetrapolar circuits , detection of physiological activities using impedance techniques - cardiac output, respiratory activity, Impedance Plethysmography- resistance and capacitance type., Pulmonary function measurements and analysers– respiratory volumes, capacities, compliance and related pressures , dynamic respiratory parameters – Spirometry – basic system – types and applications. Cardiac output measurement- different techniques

Module IV

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II
Multithreaded Programming, Java Thread Model, Creating Multiple Threads, Thread Priorities Synchronization, Event Handling Event classes, Event Listener Interfaces, Adapter Classes, Inner Classes.

Module III

Module IV

References:

Type of Questions for University Exam,
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Basic idea of control systems and their classification - differential equations of systems - linear approximation - Laplace transform and transfer function of linear system - Model of physical system (Electrical, mechanical and electromechanical)- block diagram - signal flow graph - Mason’s gain formula.

Module II

Module III

Module IV

References:
1. Ogata K, Modern Control Engineering, 4th Ed., Prentice-Hall India Ltd /Pearson Education
4. Dorf , Modern Control system, Pearson Education, 8th ed.
5. Franklin, Feedback Control Systems, Pearson Education

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III

Module IV

References:
7. Simon Haykin: “Neural Networks”, Pearson Education1 998.

Type of Questions for University Exam
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III
Network Layer: Virtual circuits and data grams -Datagram and Virtual circuit service- Routing - different types of congestion control – IP protocol – Subnets – Multicasting - Network layer in ATM.
Transport layer – Transport layer services - design issues – Elements of transport Layer – Internet Transport Protocols (TCP and UDP).

Module IV

References:
5. Uyless Black, Computer Networks - Protocols, Standards and Interfaces, PHI Ltd., 1994

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II
Synchronous sequential systems- state description of finite state system – Mealy and Moore Machines, representation of the state transition and output functions, time behavior of finite sate machines, finite memory sequential systems, equivalent sequential systems and minimization of the number of states, Binary specification of sequential systems, Different types of sequential systems- modulo-p counter – pattern recognizer – block pattern recognizer – sequential decoders.

Module III

Module IV

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Introduction to Microsystems, MEMS and BioMEMS—Evolution of Microfabrication—Introduction to Nanotechnology—Comparison of these systems. *Silicon microfabrication techniques*-photolithography (high resolution), Ion Implantation, oxidation, diffusion, sputtering, epitaxial growth, etching—Design of flow processes in bulk manufacturing—surface micro machining—the LIGA process—EFAB fabrication—Microsystem packaging.

Module II

Module III:
MEMS Devices: Pressure sensors, accelerometers, micromotors, micropumps, microvalves, thermal sensors and actuators, prosthetics made of MEMS.

Module IV
Nanosensors and nanodevices for clinical diagnostics—nanostructures for drug delivery, nano arrays, use of nano analytical devices and systems—potential use of DNA and other biomolecules for computing and ultra high density data storage. Application of Nanotechnology to Medical Therapy.

References:
1. Ferrari, Mauro *BioMEMS and Biomedical Nanotechnology* Springer 2006
3. Tai-Ran Hsu, *MEMS & Microsystems*, TMH, New Delhi
7. Mark A Ratner, Daniel Ratner *Nanotechnology: A Gentle Introduction to the Next Big Idea* PHI

Type of Questions for University Exam
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
EB 16 L1 MEDICAL ELECTRONICS LABORATORY-II

1. First order and second order high pass and low pass filters.
2. Precision rectifiers (Half wave and Full wave).
3. UJT relaxation oscillator
4. Band pass filter
5. High voltage and low voltage regulators
6. DC power control using SCR.
7. ECG simulator.
8. Basic principle of biotelemetry using IC 4046. (Transmitting ECG signals)
9. Patient isolation circuits
10. Study of PLL IC 565.
11. Sample and hold circuit
12. Study of AD 590
13. Voltage to frequency converter
14. Systolic and diastolic pressure measurement.
15. Front end of ECG machine
16. Front end of plethysmograph
17. Study of medical equipments
   i. Fetal monitor
   ii. EEG
   iii. EMG
   iv. Spirometer
   v. Plethysmograph
   vi. Defibrillator

Note: 50% marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50% marks in the aggregate and 50% minimum in the end semester examination for a pass.
Each batch comprising of 3 to 5 students shall design, develop and realize an engineering product which is having application in Biomedical field. Basic elements of product design must be considered. Fully software/simulation projects are not allowed. Each student shall submit a project report at the end of the semester. The project report should contain the design and engineering documentation including the bill of Materials and test results. Product has to be demonstrated for its full design specifications. Innovative design concepts, reliability considerations and aesthetics / ergonomic aspects taken care of in the project shall be given due weightage.

Guidelines for evaluation:

i) Attendance and Regularity 10
ii) Work knowledge and Involvement 30
iii) End-Semester presentation & Oral examination 20
iv) Level of completion and demonstration of functionality/specifications 25
v) Project Report 15

Total 100 marks

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

CS/EB/EC/EE/EI/IT 1701 INDUSTRIAL ORGANIZATION AND MANAGEMENT

Module I
Organisation: Introduction, definition of organization, system approach applied to organization, necessity of organization, elements of organization, process of organization, principles of organization, formal and informal organization, organization structure, types of organization structure.
Forms of business organization: Concept of ownership organization, types of ownership. Individual ownership, partnership, joint stock Company, private and public limited company, co-operative organizations, state ownership, public corporation.

Module II
Basic concept of management: Introduction, definitions of management, characteristics of management, levels of management, management skills
Management theory: Scientific management, contribution of Gilbreth. Gantt, Neo-classical theory, modern management theories
Functions of management: Planning, forecasting, organizing, staffing, directing, motivating, controlling, co-coordinating, communicating, decision making.

Module III
Personnel management: Introduction, definition, objectives, characteristics, functions, principles and organization of personnel management
Markets and marketing: Introduction, the market, marketing information, market segmentation, consumer and industrial markets, pricing, sales, physical distribution, consumer behaviour and advertisement.
Financial management: the basics, financial accounts, inflation, profitability, budgets and controls, cost accounting, valuation of stock, allocation of overheads, standard costing, marginal costing.

Module IV
Productivity and production: Measurement of productivity, productivity index productivity improvement procedure
Materials management and purchasing: Objectives, functions, importance of materials management. Stores and storekeeping
Inventory control: Classification, functions, inventory models, inventory costs, EOQ, Materials requirement planning

References:
1. Fraidoon Mazda, Engineering Management-, Addison -Wesley
5. Monks J.G Operations Management, MGH

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Bone: structure & composition mechanical properties of bone viscoelastic properties – Maxwell & Voight models -
anisotropy – Electrical properties of bone – fracture mechanism and crack propagation in bones – fracture fixators –
repairing of bones - mechanical properties of collagen rich tissues, teeth, Structure and functions of cartilages, tendons,
ligaments.

Module II
Cardiovascular biomechanics – Models of peripheral circulation – Concept of vascular resistance – capacitance – Lumped
parameter model of peripheral circulation – Wind Kessel simplifications. Heart as a pump – sliding filament theory – p-v
curve for ventricles – contractility – Electrical model of ventricles – cardiac cycle in p-v plane.

Module III
Artificial heart valves- biological mechanical valves - Heterografts, Homografts – testing of valves. Total Hip Prosthesis
- requirements – different types of components- Stress analysis & instrumentation, Knee Prosthesis. Human locomotion –
gait analysis - Foot Pressure measurements - Pedobarograph - Force platform.

Module IV
Monitoring Devices: Catheter Mathematical Model, response to a sinusoidal input. Tonometry- different types.

References:
1. D N Ghista, Biomechanics of Medical Devices, Macel Dekker, 1982

Type of Questions for University Exam,
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III

Module IV

References:
3. Thomas M. Deserno Biomedical Image Processing Springer-Verlag Berlin Heidelberg 2011

Type of Questions for University Exam
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Cardiac Pacemakers & Defibrillators: Effects of electric field on cardiac muscles and laws of stimulation. External and internal pacemakers - programmable pacemakers - power sources - defibrillators - basic principle and comparison of output wave forms of different DC defibrillators - energy requirements - synchronous operation - implantable defibrillators - defibrillator analyzers - RF ablation treatment for arrhythmia.

Module II
Ventilators: Basic principles - Different generators, Inspiratory phase, Different cycling mechanism - Expiratory phase - Different ventilatory adjuncts - study of typical ventilator - Anesthetic machines.

Module III

Module IV
Principle of endoscopy-Types of endoscopes, cystoscopes, laproscopes - Fiber optic endoscopes and endoscopes with integral TV cameras - Infusion pumps, peristaltic pumps – Dialysis equipments - Heart lung machines.

References:

Type of Questions for University Exam.
*Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)*
*Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)*
Module I

Module II
Modeling of human thermal regulatory system: Parameters involved, control system model etc. Biochemistry of digestion, Loss of heat to the environment, Heat transfer within the body, Models describing heat transfer between core and skin, heat distribution in extremities.

Module III

Module IV

References:
3. Arthur C Guyton, Text Book of Medical physiology, PRISM Books India, 2000
4. Peter Dayan, Theoretical Neuroscience: Computational and Mathematical modeling of Neural systems MIT Press
5. Vasilis Z Marmarelis, Nonlinear Dynamic Modeling of Physiological systems IEEE Press series in Biomedical Engineering,
6. Rushmer, Medical Engineering, Academic Press
8. Kennedy & Blackie, Electromedical Engineering
9. Webstar, Electronic Devices for Rehabilitation
10. Myers, Engineering in Heart and Blood Vessels, Wiley International
11. Ibrall & Guyton, Regulations and Control in Physiological Systems, Instruments Society USA
12. Brown & Gann, Engineering in Physiology Vol 1 & Vol 2

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III

Module IV

References:

Type of Questions for University Exam
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III

Module IV
Introduction to ARM family of microcontrollers- General features of ARM7,ARM9,ARM Cortex (Basic features only).

References:
3. John B Peatman Design with PIC micro-controllers:, Pearson Education.

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III

Module IV

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
EB 17 L1 BIOSIGNAL PROCESSING LABORATORY

1. MATLAB familiarization
2. Acquisition of biosignals to the system
3. Implementation of filters.
4. Processing of ECG signals for acquiring parameters like heart rate, QRS complex, P wave etc
5. Arrhythmia analysis.
6. Analysis of plethysmographic signal.
7. Automated detection of systolic and diastolic pressure from cuff pressure and peripheral pulse.
9. 50 Hz interference rejection in ECG signals.
10. Event detection in EEG signals
11. Spectral analysis of EEG, EMG signals.

Note: 50% marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50% marks in the aggregate and 50 % minimum in the end semester examination for a pass.
EB 17 L2 BIOENGINEERING LABORATORY

1. Flash ADC
2. Automatic gain compensator
3. Power amplifier of stylus movement
4. X-ray timer circuit
5. ESU waveform generator
6. Chart drive circuit.
7. QRS detector circuit.
8. Study of IC 7107
9. ECG monitor circuit.
10. Study of
   i. ECG monitor and recorder
   ii. Defibrillator
   iii. ESU
   iv. X-Ray Machine
   v. Tread Mill
   vi. Holter Recorder

Note: 50% marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50% marks in the aggregate and 50% minimum in the end semester examination for a pass.
Each batch comprising of 3 to 5 students shall identify a project related to the curriculum of study. At the end of the semester, each student shall submit a project synopsis comprising of the following.

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

**Guidelines for evaluation:**

i) Attendance and Regularity 10

ii) Quality and adequacy of design documentation 10

iii) Concepts and completeness of design 10

iv) Theoretical knowledge and individual involvement 10

v) Quality and contents of project synopsis 10

**Total 50 Marks**

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

The first phase of the main project including the literature survey, schematic block or algorithms, design of the project and implementation of the initial phase of the project shall be completed. A report on the work done in this phase shall be submitted by each student by the end of the VIII semester. There will be an internal examination of the project that includes oral presentation regarding the overall project and demonstration, if any, of the completed work. The evaluation panel shall consist of at least three faculty members including the project coordinator, guide and one senior faculty member of the department.
EB 17 L4 SEMINAR

Students shall individually prepare and submit a seminar report on a topic of current relevance related to the field of Electronics & Biomedical Engineering. The reference shall include standard journals, conference proceedings, reputed magazines and textbooks, technical reports and URLs. The references shall be incorporated in the report following IEEE standards reflecting the state-of-the-art in the topic selected. Each student shall present a seminar for about 30 minutes duration on the selected topic. The report and presentation shall be evaluated by a team of internal experts comprising of 3 faculty members based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the seminar report.
SEMMESTER VIII

EB 1801 PRINCIPLES OF RADIO DIAGNOSIS AND RADIOTHERAPY

Module I

Module II

Module III

Module IV

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
EB 1802 BIOMATERIALS

Module I

Module II

Module III

Module IV

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Principles of operation and characteristics & properties of common continuous and pulsed lasers used in medicine – He-Ne, Nd-YAG, Argon, CO₂, free electron and semiconductor lasers.

Module II


Module III


Module IV

Biophotonic Therapy: Photodynamic therapy- basic principle, photosensitizers, mechanism of photodynamic action, applications – Laser tissue welding, lasers in dermatology, neurosurgery, ophthalmology, urology.

References:
5. Leon Goldman, Lasers in Medicine, Springer-Verlag.

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x 5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module 1
Definitions of telemedicine telehealth and telecare. History of telemedicine: Main phases of telemedicine Pre electronic telemedicine Electronic telemedicine Technical Requirements, Type of information and standards, audio, data, Fax, Video Types of communications and networking- networking architecture, POTS, ISDN, ATM Other Fixed networks, Air/airless communications.- RF, Microwaves, Satellite, GSM, CDPD (Cellular Digital Packet Data) Acquisition/ displays: Acquisition systems Cameras, Scanners, Other medical specialized acquisition system
Display systems: Analogue devices, LCD, Laser displays, Holographic representations, Virtual screen devices
Computation / storage systems: Magnetic, Mixed, Optical (laser) devices (only brief description required)

Module II

Module III

Module IV
Ethical and legal aspects of telemedicine-confidentiality, patient rights and consent-ethical and legal aspects of internet-telemedical malpractice. Constraints for the wide spread use of telemedicine-constraints linked to economy, social acceptance Strategic planning for telemedicine implementation. Analysis of the present situation and the demand Objectives and strategies - Plan of implementation Forces affecting technology transfer scenarios for telemedicine.

References:
3. Ling Guan, Multimedia image and video processing, CRC Press 2000
5. Douglas V.Goldstein, “ E Healthcare: Harness the power of Internet, e-commerce and e-care”, Jones and Barlett Publishers

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I
Basic Concepts of Molecular Biology: Cells - Chromosomes, DNA, RNA, Proteins, Central dogma of molecular biology, Genomes and Genes - Genetic code, Transcription, Translation and Protein synthesis. Web based genomic and proteomic data bases: NCBI, Gen Bank

Module II
Sequence alignments – Dot plot-Pair-wise sequence alignments - local and global -Sequence similarity and distance measures - Smith-Waterman algorithm, Needleman-Wunch algorithm, Multiple sequence alignment –Sum-of-Pairs measure - Star and tree alignments – PAM and BLOSUM, Phylogenetic analysis

Module III
Informational view of Genomic data, Genomic Signal Processing, DNA Spectrogram, Identification of protein coding regions, Gene expression, Microarrays, Microarray image analysis

Module IV
Gene structure in Prokaryotes and Eukaryotes: Molecular Structure Prediction: Basic concepts and terminologies related to molecular structures, Basic molecular Visualization, RNA secondary structure prediction, Protein folding problem, Protein Threading, Protein Visualization, Introduction to Drug Discovery.

Case Study
Software Tools: Use of Tools for basic and specialized sequence processing such as: BLAST, FASTA, RasMol, Phylip, ClustalW

References:
6. Jiang, Xu and Zhang, Current topics in Computational Molecular Biology, Ane Books, New Delhi, 2004
7. S.C Rastogi & Namitha Mendiratta, Bioinformatics method and application Genomics,Proteinomics & drug discovery
8. Dov Stekel, Microarray Bioinformatics, Cambridge University Press

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

Module II

Module III

Module IV

References:

Type of Questions for University Exam.
Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)
Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)
Module I

**VLSI process integration:** The MOS device - (n - channel & p-channel) - capacitance of MOS structure - accumulation, depletion and inversion, threshold voltage, current equations - characteristics, channel pinch-off. Second order MOS device effects: short-channel effect, narrow width effect, sub-threshold current, device saturation characteristics. Fundamental considerations in IC processing - NMOS and PMOS IC technology - CMOS IC technology - BiCMOS IC technology. -Introduction to GaAs technology. Design technology-design flow-Y chart.

Module II

Switch logic- pass transistors and transmission gates, Gate logic-The basic inverter using NMOS-circuit - current equations - pull up to pull down ratio- transfer characteristics- Alternate forms of pull up. Basic NAND, NOR circuits. The CMOS inverter, characteristics – NAND, NOR and compound circuits using CMOS. Other forms of CMOS logic : pseudo CMOS, CMOS domino logic, n-p logic. Layout design rules for MOS circuits – Lambda based rules-general principles & steps of lay-out design - use of stick diagrams - design rules - Layout examples of Inverter, NAND and NOR.

Module III


Module IV

**Timing issues in VLSI system design:** timing classification- synchronous timing basics – skew and jitter- latch based clocking- self timed circuit design - self timed logic, completion signal generation, self timed signaling–synchronizers and arbiters.

References:

4. S M Sze, *VLSI Technology,PHI.*

**Type of Questions for University Exam.**

*Q 1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8 x5 = 40 marks)*

*Q 2. to Q 5. Two questions A & B of 15 marks from each module with option to answer either A or B. (4 x 15 = 60 marks)*
EB 18 L1 MAIN PROJECT

Each batch of students shall develop the project designed during the VII semester. The implementation phase shall proceed as follows:

- For hardware projects, practical verification of the design, PCB design, fabrication, design analysis and testing shall be done.
- For software projects, a proper front end (GUI) if applicable, shall be designed. A detailed algorithm level implementation, test data selection, validation, analysis of outputs and necessary trial run shall be done.
- Integration of hardware and software, if applicable, shall be carried out.
- A detailed project report in the prescribed format shall be submitted at the end of the semester. All test results and relevant design and engineering documentation shall be included in the report.
- The work shall be reviewed and evaluated periodically.

A committee consisting of the Project Coordinator (appointed by the Head of the Department/Division), project guide and at least one senior faculty member will carry out the assessment based on at least one interim review and a final review just before the submission of the project report. The final evaluation of the project shall include the following:

- Presentation of the work
- Oral examination
- Demonstration of the project against design specifications
- Quality and content of the project report

**Guidelines for evaluation:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regularity and progress of work</td>
<td>60</td>
</tr>
<tr>
<td>Work knowledge and Involvement</td>
<td>60</td>
</tr>
<tr>
<td>End semester presentation and oral examination</td>
<td>60</td>
</tr>
<tr>
<td>Level of completion and demonstration of functionality/specifications</td>
<td>60</td>
</tr>
<tr>
<td>Project Report – Presentation style and content</td>
<td>60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300 marks</strong></td>
</tr>
</tbody>
</table>

**Note:** Points (i) and (ii) to be evaluated by the respective project guide and the project coordinator based on continuous evaluation. (iii) - (v) to be evaluated by the final evaluation team.
Each student is required to appear for a viva-voce examination at the end of the complete course work. The student shall produce the seminar report and project reports duly attested by the institutional authorities, before the examiners. The examination panel shall comprise of Head of the Department/ Division or his/her nominee and one senior faculty of the Department/ Division and an external expert. The examiners except the Head of the Department/ Division or his/her nominee shall be, both appointed by the University. The examiners shall evaluate the student in terms of their conceptual grasp of the course of study and practical/analysis skills in the field.