SYLLABI OF FIRST YEAR COURSES OF

B.E. / BEMBA in Biotechnology Engineering
B.E. / BEMBA in Computer Science & Engineering
B.E. / BEMBA in Electronics & Communication Engineering
B.E. / BEMBA in Electrical & Electronics Engineering
B.E. / BEMBA in Information Technology Engineering
B.E. / BEMBA in Mechanical Engineering
B.E in Civil Engineering
B.E. in Electronics and Electrical Communication Engineering

FOR 2011-12

**COMPULSORY SUBJECTS**

<table>
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<tr>
<th>Theory Paper Code</th>
<th>Paper Title</th>
<th>Semester</th>
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**OPEN ELECTIVE SUBJECTS**

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# OPTION I

## SEMESTER I

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# OPTION II

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SYLLABUS FOR
FIRST YEAR COURSES
IN
BE AND BEMBA
OF
ALL BRANCHES

Total Credits: 23
COMPULSORY SUBJECTS
AS 101 : Engineering Mathematics – I (Theory in First Semester)

Max (Univ. Exam) Marks : 50
Internal Assessment : 50

Time of examination: 3hrs.
Total Credits: 4

Course Duration: 45 lectures of one hour each with 3 lectures and one tutorial per week.

Note for the paper setter: Total of 8 questions be set with 4 questions from part A and four questions from part B. Candidate will be required to attempt any 5 questions selecting at least two from each part.

PART A

Differential Calculus of Functions of two variables (12 hrs)
Concept of limit and continuity of a function of two and three variables, Partial derivatives, total differential, differentiation of an implicit function, chain rule, change of variables, Jacobian, Taylor’s and Maclaurin’s series. Maxima and minima of a function of two and three variables: Lagrange’s method of multipliers
(Scope as in Chap. 12, Sections 12.1 – 12.6, 12.8 – 12.9 of Reference 1).

Integral Calculus (11 hrs)
Areas of curves, Length of curves, Volume and surface areas of revolution, Double integrals, Change of order of integration, Areas enclosed by plane curves, Triple integrals, Volume of solids
(Scope as in Chapter 5, Sections 5.1, 5.3, 5.5, 5.6, Chap. 13 of Reference 1).

PART B

Vector Differential Calculus (10 hrs)
Vector-valued functions and space curves, arc lengths, unit tangent vector, Curvature and torsion of a curve, Gradient of a Scalar field, Directional Derivative
(Scope as in Chap. 11, Sections 11.1, 11.3, 11.4, Chap. 12, Section 12.7 of Reference 1).
Vector Integral Calculus (12 hrs)
Line integrals, Vector fields, Work, Circulation and Flux, Path Independence, Potential functions and Conservative fields, Green’s theorem in the plane, Surface Areas and Surface Integrals, Stoke’s Theorem, Gauss Divergence Theorem
(Scope as in Chap.14 of Reference 1).

References:

AS 201: Engineering Mathematics – II (Theory in Second Semester)

Max. (Univ. Exam) Marks : 50 
Internal Assessment: 50

Time of examination: 3hrs. 
Total Credits: 4

Course Duration: 45 lectures of one hour each with three lectures and 1 tutorials per week.

Note for the paper setter: Total of 8 questions be set covering the whole syllabus. Candidate will be required to attempt any 5 questions selecting at least two from each part.

PART A

Ordinary Differential Equations (12 hrs)

Laplace Transforms (10 hrs)
Laplace transform, Inverse transforms, shifting, transform of derivatives and integrals. Unit step function, second shifting theorem, Dirac's Delta function. Differentiation and integration of transforms. Convolution Theorem on Laplace Transforms. Application of Laplace transforms to solve ordinary differential equations with initial conditions. (Scope as in Chapter 5, Sections 5.1 – 5.5 of Reference 1).

PART B

Fourier Series and Transforms (8 hrs)
Periodic functions, Fourier series, Even and odd series, half range expansions, Complex Fourier Series, Approximation by trigonometric polynomials. Fourier integrals, Fourier Cosine and Sine transforms, Fourier Transforms (Scope as in Chapter 10, Sections 10.1 – 10.5, 10.7 – 10.10 of Reference 1).
Partial Differential Equations (6 hrs)
Partial differential equations of first order, origin, solution of linear partial differential equations of first order, Integral surfaces passing through a given curve
(Scope as in Chapter 2, Sections 1, 2, 4, 5 of Reference 4).

Boundary Value Problems (8 hrs)
D’Alembert’s solution of wave equation, separation of variables: one dimension and two dimension heat and wave equation, Laplace equation in Cartesian and Polar coordinates
(Scope as in Chapter 11, Sections 11.1, 11.3 – 11.5, 11.8 – 11.9 of Reference 1).

References:
OPTION I
AS102/202: Physics (Theory)

Course Duration: 45 lectures of one hour each with 4 lectures per week. In addition there one hour per week of tutorial class.

Note for the paper setter: In all eight questions will be set with 4 questions from each section. The candidate will be required to attempt 5 questions with a condition of at least 2 questions from each section. The numerical problems to the extent of 30% of maximum marks can be put in the question paper.

Objective of syllabus: The main objective of this syllabus is to expose students to the basic Physics with a view to (a) provide deeper insight in understanding of engineering courses. (b) awaken them to understand latest developments in engineering and technology and (c) to enable them to work in inter-disciplinary areas, having potential of new technologies.

SECTION A

OPTICS (11 hrs)

Polarization
Production of polarized light, Malus’ law, superposition of two disturbances and states of polarization, phenomenon of double refraction, Interference of polarized light, quarter and half wave plates, analysis of polarized light, optical activity. (Book 1, 19.1-19.8)

Lasers (Qualitative treatment)
Basic principle of Laser Production (Qualitative treatment), Einstein’s coefficients, three and four level lasers, He-Ne, Ruby and semiconductor lasers (Book 1: 23.1-23.3)

Holography
Basic principle, theory and requirements. (Book 1: 18.1-18.4)
Fiber Optics
Basics of fiber optics and fabrication, step index and graded index fiber, Qualitative idea of signal distortions and dispersions, transmission losses, fiber optic sensors and their applications. (Book 1, 24.1 – 24.11)

QUANTUM PHYSICS (11 hrs)

Wave-Particle Duality

Schrodinger’s Equation & Its Applications
Time dependent and independent Schrodinger’s equation, Properties of well-behaved wave function, probability current and its interpretation by Max Born, operators and their expectation values. (Book 2: 7.2, 7.4 – 7.9), bound state solutions of the Schrodinger’s equation for a particle in one dimension - rigid box, non-rigid box (Book 2: 8.1- 8.4)

SECTION B

SOLID STATE PHYSICS (23 hrs)
Crystal Structure: Geometrical crystallography (periodicity in crystals, symmetry elements, brief idea of symmetry groups) and structure of crystals (equivalent positions in the unit cell, spheres in closest packing, idea of reciprocal lattice and Brillouin zone, determination of crystal structure), simple crystal structures (NaCl, CsCl, Diamond, silica, ZnS, carbon nanotubes). (Book 4: Chapters 1 and 2)

Types of imperfections and vacancies, diffusion, dislocation and mechanical strength of materials. (Book 3: 11.1-11.4, 11.6)
Properties of Metals
Free electron theory, zone theory, electrical properties, thermal properties, thermionic emission, motion in magnetic field (cyclotron resonance and Hall effect)(Book 4: Chapter 10, also Book 3: 4.1- 4.10, 4.12, 4.13).

Dielectric and Optical Properties of Materials
Review of basic formulas, dielectric constant and polarizability, sources of polarizability, classical treatment of dipolar, ionic and electronic polarizability, piezoelectricity, ferroelectricity. (Book 3: 8.1 – 8.5, 8.8, 8.9-8.11).

Magnetic Materials: Review of basic formulas, magnetic susceptibility, classification of materials, Langevin diamagnetism, paramagnetism (only classical treatment), magnetism in metals, ferromagnetism in insulators, anti-ferromagnetism and ferrimagnetism, ferromagnetism in metals, ferromagnetic domains, hysteresis (Book 3: 9.1-9.11)

Recommended Books:

Reference Books:

AS152/252 Physics (Practical)

Marks: 50          Total Credits : 2

Instruction for Students: The candidate will attend a Physics laboratory session of three hours weekly and has to perform a total of eight experiments with two experiments from each of the sections A and B while four experiments from section C.

SECTION A (OPTICS)
1. To Determine the refractive index of a glass prism by spectrometer.
2. To determine specific rotation of sugar solution by using Laurant’s half shade or Biquartz polarimeter
3. To determine wavelength of sodium light by Newton’s ring method.
4. To determine velocity of ultrasonic waves in different liquids using ultrasonic interferometer

SECTION B (MEASURING INSTRUMENTS)
5. To determine inductance of a given coil by using Anderson’s Bridge.
6. To determine the specific resistance of the wire of a given material and to measure the resistance of a galvanometer using post office box.
7. To study the variation of magnetic field with distance along axis of a circular coil carrying current using Stewart and Gee’s tangent galvanometer and to plot the graph between distance from the center and tangent of angle of deflection.
8. To determine the value of unknown capacitance by measuring the time of flashing and quenching of a neon bulb.

SECTION C (PHYSICS OF MATERIALS)
9. To find the value of Planck’s constant and evaluate the value of work function of cathode material by use of Photoelectric cell.
10. To study quantized energy of the first excited state in Argon using Frank-Hertz set up.
11. To study temperature dependence of resistivity of a semiconductor using four probe method and to determine the band gap of a semiconductor.
12. To determine the Hall coefficient of a semiconductor material and then evaluate, carrier type and its density and mobility of charge carrier of a given semiconductor material.
13. To determine the response of a photoresistor to varying light intensity falling on it and deduce the spectral sensitivity of the semiconductor material.
14. To plot the hysteresis loop of a given magnetic material (iron and steel) and determine the retentivity, coercivity and energy dissipated per cycle of hysteresis.
15. To study various characteristics of a photovoltaic cell (a) Voltage-current characteristics (b) loading characteristics (c) Power-Resistance characteristics and (d) inverse square law behavior of photocurrent with distance of source of light from photovoltaic cell.
16. To find the Curie temperature of a ferroelectric material by measuring capacitance as a function of temperature.
EC101/201: Basic Electronics (Theory)

Max. (Univ. Exam) Marks : 50         Time of examination: 3hrs.
Internal Assessment: 50         Total Credits: 4

Course Duration: 45 lectures of one hour each with 3 lectures per week.

Note for the paper setter: In all eight questions will be set with 4 questions from each section. The candidate will be required to attempt 5 questions with a condition of at least 2 questions from each section.

**PART A**

**Semiconductor Diode** (5hrs)

**Bipolar Junction Transistor** (6hrs)
Introduction, Junction Transistor Structure, Operation, Transistor amplifying action, CB, CC and CE Configuration, characteristics, application of transistor as an amplifier.

**Field Effect Transistor** (5hrs)
Introduction, Types of FET's, JFET's, MOSFET's, CMOS, characteristics, working, applications.

**Operational Amplifiers** (6hrs)
Block Diagram, Characteristics of an ideal OP-AMP, Application of OP-AMP as an Inverting amplifier, Phase Shifter, Scale Changer, Non-inverting amplifier, Adder or Summing amplifier, differential or difference amplifier, integrator.

**PART B**

**Oscillators** (5hrs)
Block Diagram of feedback circuit used as an oscillator, Barkhausen criterion, types of oscillators.

**Boolean Algebra and Logic Gates** (5hrs)
Binary and Hexadecimal number system, BCD and weighted codes, Binary arithmetic, Logic-positive and negative logic, basic and universal logic gates. Boolean algebra and postulates, reduction of Boolean expression.

**Flip Flops (6hrs)**

Concept of flip-flops, RS, D, JK and T types, triggered and clocked, master slave, Shift Register, concept of synchronous and asynchronous counters. Half and full adder, subtractor, Seven Segment display, Concept of Mux, deMux, decoder and encoder.

**Test and Measuring Instruments (4hrs)**


**Communication (3hrs)**

Basic Concepts, Modulation, Need for modulation, introduction to AM, FM, PM.

**Recommended Books:**

5. Helfrick and Cooper : Modern Electronics Instrumentation and Measurement Techniques, Prentice Hall of India
EE101/201: Basic Electrical Engineering (Theory)

Max. (Univ. Exam) Marks : 50          Time of examination: 3hrs.
Internal Assessment: 50          Total Credits : 4

Course Duration: 40 lectures of one hour each with 3 lectures per week.

Note for the paper setter: In all eight questions will be set with 4 questions from each section. The candidate will be required to attempt 5 questions with a condition of at least 2 questions from each section.

SECTION A

1. DC circuits 08 hours
Voltage and current sources, Kirchhoff’s laws and network solution, network analysis by mesh and node analysis, superposition theorem, Thevenin’s theorem, Norton’s theorem, delta-star transformation and vice-versa, maximum-power transfer theorem (numericals based on these theorem).

2. Single Phase AC Fundamentals 06 hours
Alternating current systems, waveform terms and definitions, average and r.m.s. values of alternating, quantities, phasor notation, solution and phasor diagram of single phase ac circuits with sinusoidal source excitation.

3. Three Phase AC Fundamentals 05 hours
Disadvantages of single phase system, three phase voltages and currents, voltages and currents in star and delta connected systems, power in a three phase system, solution of three phase balanced circuits, power and power factor measurement by two watt-meter method.

SECTION B

4. Magnetic Circuit 06 hours
Introduction to magnetic circuit, magneto motive force and magnetic field strength, permeability of free space, relative permeability, reluctance, comparison of electric and magnetic circuits, $B/H$ curve, magnetic circuits calculations, self and mutual inductance.

5. **Transformers** 05 hours
   Introduction, Basic Principle, EMF equation, approximate equivalent circuit, phasor diagram, losses, efficiency and condition for maximum efficiency, voltage regulation, open circuit and short circuit tests.

6. **Electric Machines** 10 hours
   Operating principle and application of DC machine and three phase induction motors.

**Recommended Books**

EE151/251: Basic Electrical Engineering Practical

Marks: 50
Total Credits : 2

Note: The candidate will attend a laboratory session of three hours weekly. Experiments No. 1 and 2 and at least 5 experiments out of 3 to 9 are to be done.

1. Study the forward and reversed biased diode characteristics.
2. Study the CB, CE, CC transistor characteristics.
3. Measure resistance and inductive reactance of a choke coil make a series RLC circuit using the choke coil and obtain its phasor diagram and study resonance.
4. To prove superposition and maximum power theorem.
5. To prove Thevenin’s and Norton's theorem.
6. To find out the relationship between line current & phase current, between line voltage & phase voltage for star and delta connected loads supplied from balanced three phase supply
7. To measure power and power factor using wattmeter in single phase circuit
8. Perform Open circuit and short circuit tests on a single phase transformer to draw equivalent circuit..
9. To connect, start and reverse the direction of a 3 Phase Induction Motor and measure speed. / torque.
ME153/253: Engineering Graphics (Practical)

Max. Marks : 100                    Total Credits : 3

Instruction for Students: The candidate will be attending two laboratory sessions of 3 hours each weekly.

Introduction to Engineering Graphics, Methods of projections, Theory of orthographic projection.
Introduction to CAD software
Conventional practices, dimensioning as per BIS SP 46-1988
Pictorial sketching
Projection of points, lines and planes on principal planes
Projection on auxiliary planes
Projection of solids, solid modeling
Section of solids
Elementary development and intersection of solids
General introduction to isometric views
Applications: Drawing of threaded fasteners, Electrical and Electronic drawings using first angle projection

Recommended Books:
1. James D. Bethune : AutoCAD, Pearson Publishers
AS105/205: Environmental Education (Theory)


Course Duration: 40 lectures of one hour each with 3 lectures per week

Note: The University Examination will consist of 100 multiple choice questions with each question carrying four choices. The paper set will uniformly cover whole of the syllabus. There will no negative marking for wrong answers.

UNIT I : The multidisciplinary nature of environmental studies, definition, scope and importance. Need for public awareness.

UNIT II (Ecology and Ecosystems) : definition of ecology, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chain, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and functions of the following ecosystems: forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT III (Biodiversity and conservation) :
(i) Introduction-definition: genetic species and ecosystem diversity.
(ii) Value of bio-diversity, consumptive use, productive use, social, ethical, aesthetic and option values.
(iii) Biodiversity at global, national and local levels.
(iv) India as a mega-diversity nation.
(v) Hot spots of bio-diversity.
(vi) Threats to bio-diversity : habitat loss, poaching of wildlife, man wildlife conflicts.
(vii) Endangered and endemic species of India.

UNIT IV (Natural Resources)  Natural Resources and their Conservation
(i) Air Resources: Features, composition, structure, air quality management.
(ii) Forest Resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.

(iii) Water Resources: Use and over-exploitation of surface and ground water, floods, draughts, conflicts over water, dams-benefits and problems; water quality management; management of water resources e.g. rivers, lakes, ground water etc, fluorosis and arsenic problems.


(v) Energy Resources: Growing energy needs, renewable and non-renewable resources, use of alternate energy sources, case studies.

(vi) Land Resources: land as a resource, land degradation, man induced landslides, soil erosion, desertification.

(a) Role of an individual in conservation of natural resources and prevention of pollution.

(b) Equitable use of resources for sustainable life styles.

(c) Disaster management: floods, earthquake, cyclone and landslides.

UNIT V (Environmental Pollution)

Definition:

(i) Air Pollution: definition, causes, effects and control measures: Air quality management, Air pollution, case studies.

(ii) Water Pollution: Definition, causes, effects and control measures, case studies, water quality management.

(iii) Definition, causes effects and control measures.

(iv) Marine pollution

(v) Thermal pollution

(vi) Soil Pollution: definition, causes and control measures, case studies.

(vii) Noise Pollution.

(viii) Solid Waste Management: causes effects and control measures of urban and industrial wastes, hazard waste; bio-medical waste.

(ix) Role of individual in prevention of pollution.

(x) Pollution case studies.

(xi) Disaster management: floods, earthquakes, cyclone and landslides.
UNIT VI (Social Issues and Environment)

(i) From unsustainable to sustainable development.
(ii) Urban problems related to energy.
(iii) Water conservation, rain water harvesting.
(iv) Resettlement and rehabilitation of people: Its problems and concerns; case studies.
(v) Environmental Ethics: environmental value relationship; environmental ethics and species preservation.
(vi) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust; case studies.
(vii) Wasteland reclamation.
(viii) Consumerism and waste products.
(ix) Legislation to protect environment
   (a) Environmental Protection Act.
   (b) Air (Prevention and Control of Pollution) Act.
   (c) Water (Prevention and Control of pollution) Act.
   (d) Wildlife protection Act.
   (e) Forest Conservation Act.
   (f) Environmental impact Assessment (EIA)
   (g) Environmental Management Systems (EMS0 and Environmental information Systems (EIS).
   (h) P.I.L Public hearing and role of NGOs.
   (i) Issues involves in enforcement of environmental legislation.
   (j) Public Awareness.
   (k) Environmental Economics: Environment and standard of living.

UNIT VII (Human Population and Environment)

(i) Population growth, variation among nations.
(ii) Population explosion, family welfare programs.
(iii) Environment and human health.
(iv) Human rights.
(v) Value Education.
(vi) HIV/AIDS
(vii) Women and child welfare.
(viii) Role of information technology in environment and human health.
(ix) Case Studies.
OPTION II
AS104/204 : Chemistry (Theory)

Max. (Univ. Exam) Marks : 50         Time of examination: 3hrs.
Internal Assessment: 50         Total Credits : 4

Course Duration: 45 lectures of one hour each with four lectures per week.

Note for the paper setter: Total of 8 questions be set with 4 from section A and four from section B. Candidate will be required to attempt any 5 questions with at least two questions from each section.

SECTION A

Thermodynamics (10 hrs)

Catalysis (6 hrs)
Catalysis and general characteristics of a catalytic reactions, homogenous catalysis, acid base catalysis and enzyme catalysis – Michealis Menten equations. Heterogenous catalysis. Application of catalysis for industrially important processes – hydrogenation (Wilkinson’s catalyst), hydroformylation, acetic acid process, Wacker process.

Corrosion (5 hrs)
Types of corrosion, dry and wet corrosion and their mechanisms, types of electrochemical corrosion (galvanic, pitting, waterline, differential aeration, soil, microbiological, inter-

SECTION B

Polymers (5 hrs)

Spectroscopy (12 hrs)
Definition and scope, atomic spectroscopy, absorption and emission spectra (definitions), Born Oppenheimer approximations (Separation of molecular energies into translational, rotational, vibrational and electronic contributions. Relative magnitude of such differences), Electromagnetic spectrum.

Electronic spectroscopy: Introduction, Lambert-Beer’s law, selection rules, application to simple organic molecules (chromophores, effect of auxochromes, conjugation, solvent on transition of organic molecules)

Infrared spectroscopy: Introduction, principles of IR spectroscopy- fundamental vibrations selection rules and application to simple organic molecules (effects of masses of atoms, bond strength, nature of substituent, hydrogen bonding on IR frequencies), sample preparation for IR.

Separation Techniques (6 hrs)
Chromatography: Introduction, Classification of chromatographic methods, Chromatographic mechanism, Terminology used, Efficiency and resolution, Elution, Introduction to thin layer Column Chromatography, Gas Chromatography and High Performance Liquid Chromatography (a short note on each method).

Recommended Books:

Instruction for Students: The candidate will be attending a laboratory session of three hours weekly and has to perform any eight experiments.

1. Verify Lambert Beer’s law using spectrophotometer and CoCl₂ or K₂Cr₂O₇ solution.
2. To determine the strength of an acid solution by using conductivity meter.
3. Determination of saponification number of an oil.
4. Preparation of a phenol formaldehyde resin.
5. Experiments on TLC. (determination of Rᶠ values and identification of various compounds).
6. To determine the heat of a neutralization reaction.
7. To determine the heat of solution of given compound.
8. To determine viscosity and surface tension of liquids.
9. Determination of total hardness of a water sample.
10. Determination of copper.
11. Determination of chloride ion and dissolved O₂ in water.
12. Determination of flash point of a fuel oil.
13. To analyze a coal sample by proximate analysis.
14. To find out viscosity of lubricating oil by Redwood viscometer.

Books Recommended:
CS101/201: Programming Fundamentals (Theory)

Max. (Univ. Exam) Marks : 50  Time of examination: 3hrs.
Internal Assessment: 50    Total Credits : 4

Course Duration: 45 lectures of one hour each with four lectures per week.

Note for the paper setter: Total of 8 questions be set with 4 from part A and four from part B. Candidate will be required to attempt any 5 questions with at least two questions from each part.

Objective: To get basic knowledge of computers, its components and Operating systems and Linux. Shell Commands. To acquire programming skills in C and basic knowledge of Object Oriented Programming.

PART A

1. **Introduction:** (8 hrs)
   Computer Basic, Block Diagram of Computer, Memory Hierarchy, Types of RAM, Secondary Memory Introduction to Operating Systems, Programming Languages, Program Structure, Linux Shell Commands, Bourne Shell, C Shell, Korn Shell

2. **Basic Constructs of C:** (8 hrs)
   Keywords, Identifiers, Variables, Symbolic Constants, Data Types and their storage, Operands, Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Increment & Decrement Operators, Expressions, Conditional Expressions, Assignment Operators and Expressions, Type Conversions, Precedence and Order of Evaluation, External Variables and Scope of Variables. Basic Input Output, Formatted I/O.

3. **Program Control Flow:** (4 hrs)
   Statements and Blocks, Conditional Statements, IF, ELSE-IF, Switch Case statements, Control Loops, For, While and Do-While, Go to and Labels,
4. **Arrays & Functions**: (8 hrs)
   Pointers and Addresses, Arrays, Multi dimensional arrays, strings, pointer arrays, Functions, Function Prototyping, Scope of functions, Arguments, Call by value and call by references, static variables, recursion.

PART B

5. **Structures**: (4 hrs)
   Structures, Array of Structures, pointer to structures, Typedef, Unions, Bit fields, passing structures as an argument to functions, C-Preprocessor and Macros, Command line arguments.

6. **Input and Output** (7 hrs)
   Standard and Formatted Input and Output, File Access & its types, Line Input and Output, Types of Files, Binary & ASCII Files, Error handling, stderr and exit functions

7. **Introduction to Object Oriented Programming**: (6 hrs)
   Classes and Objects, Structures vs Classes, Abstraction, Encapsulation, Polymorphism, Inheritance.

**Recommended Books:**

Instruction for Students: The candidate will be attending a laboratory session of 3 hours weekly and students have to perform the practical related to the following list.

1. Introduction to UNIX Shells, C Shell, Bourne Shell, Korn Shell
2. Writing and compiling C Program in Linux.
3. Introduction to basic structure of C program, utility of header and library files.
4. Implementation of program related to the basic constructs in C
5. Program using different data types in C
6. Programs using Loops and Conditional Statements in C
7. Programs using arrays single dimension and multi dimensions in C.
8. Implementation of Matrices and their basic functions such as addition, subtraction, multiplication, inverse.
9. Programs using functions by passing values using call by value and call by reference method
10. Programs related to structures and unions
11. Program to implement array using pointers
12. Programs related to string handling in C
13. Program to manage I/O files
14. Introduction to classes and program related to basic use of classes showing their advantages over structures.
15. Any other program related to theory program to enhance the understanding of students in the subject.
ME101/201: Fundamentals of Mechanical Engineering (Theory)

Max. (Univ. Exam) Marks : 50  Time of examination: 3hrs.
Internal Assessment: 50  Total Credits : 4

Course Duration: 45 lectures of one hour each with three lectures and one tutorial per week.

Note for the paper setter: Total of 8 questions may be set covering the whole syllabus with equal weightage to all groups of the syllabus. Candidate will be required to attempt any 5 questions with at least two questions from each group.

Group A
1. Laws Of Thermodynamics:  (6 hrs)
   First law of thermodynamics, Steady flow energy equation and its applications (nozzle, throttling device, turbine, compressor, heat exchanger). Limitations of first law, statements of second law by Max-Planck and Clausius, equivalence between the two statements. Reversible and irreversible processes, Carnot’s theorem. Energy analysis of a heat engine, refrigerator and heat pump.

2. Steam and Its Formation:  (5hrs)
   P-V, P-T, T-S, H-S diagrams of water. Dryness fraction and its measurement by calorimeter. Uses of steam tables and Mollier chart (H-S chart)

3. Power Cycles:  (5hrs)
   Carnot and Rankine steam power cycles. Effect of mean temperature of heat addition on Ranking cycle efficiency. Otto, Diesel and Dual combustion cycles for reciprocating I.C. engines.

Group B
4. Kinematics of Fluid Flow:  (4hrs)
   Types of flow, acceleration in fluid flow, stream lines, stream tubes, irrotational flow, stream function, velocity potential, flow nets.
5. **Fluid Dynamics:**  
   (4hrs) 
   Equation of continuity, Euler’s Equation, Bernoulli’s equation, simple applications to one dimensional flow problems.

6. **Flow Measurement:**  
   (4hrs) 
   Pilot tube, Venturimeter, Orificemeter, Notches (Rectangular & Triangular) and weirs, Rotameter.

7. **Simple Stress and Strains:**  
   (5hrs) 
   Concept of stress and strain. Stress and strains in bars subjected to tension and compression, stress-strain diagrams, mechanical properties, factor of safety, Extension of Uniform bar under its own weight, stress produced in compound bars (two or three) due to axial loads.

8. **Bending moment (B.M.) and Shear force (S.F.):**  
   (6hrs) 
   Diagrams for cantilevers, simply supported beams with or without overhang and calculation of maximum B.M. and S.F. and the point of contra flexure under the following loads: Concentrated loads, Uniformly distributed loads over whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads.

9. **Bending and Torsion:**  
   (6hrs) 
   Stress in beams due to bending, proof of formulae \( M/I = f/y = E/R \) and its application to beams of rectangular and circular section. Application of torsion equation to hollow and solid circular shaft.

**Recommended Books**

ME151/251: Fundamentals of Mechanical Engineering Practical

Marks: 50          Total Credits : 2

Instruction for Students: The candidate will be attending a laboratory session of 3 hours weekly.

1. To trace the cooling, lubrication and fuel supply circuits of an IC engine.
2. To draw the valve timing diagram of Four stroke engine.
3. To determine the brake horse power and specific fuel consumption of an engine.
4. To determine dryness of steam with separating and throttling calorimeter.
5. To verify Bernoulli’s theorem.
6. To determine the coefficient of discharge for flow venturimeter/orificemeter.
7. To determine the coefficient of discharge for a rectangular notch/V-notch.
8. To perform tensile test on a ductile and brittle materials and to determine Young's modulus of elasticity, limit of proportionality, yield point, ultimate tensile stress, percentage elongation and percentage reduction in area.
9. To perform shear test and calculate shear strength for various materials.
10. To study torsion testing machine and perform the torsion test on brittle and ductile materials.
ME152/252: Workshop Practice

Marks: 100

Total Credits: 2

Instruction for Students: The candidate will be attending a laboratory session of Three hours weekly.

Practice of basic exercises related with different shops.
ELECTIVE SUBJECTS
AS106/206: Communication Skills

Internal Assessment: 25     Total Credits: 2

Course Duration: 30 lectures of one hour each with 3 hourly lectures per week

Note for the paper setter: Total of 8 questions may be set covering the whole syllabus. Candidate will be required to attempt any 5 questions.

Objectives of Course

• Developing competence in language as an individual and as an active member of society. Learning and practicing the skills of language that are experienced and reflected on imaginative works.

• Building up knowledge of important concepts in language and acquiring attitudes of interest and concern for meaning in language. These skills, experiences, concepts and attitudes constitute the basic objectives of learning English.

• Developing skills through the course which are associated with READING, WRITING, SPEAKING AND LISTENING - to read for meaning in different ways and for a range of purposes; and to read materials of greater demand and maturity. Similarly, in writing to compose in a widening variety of forms for particular purposes emphasis on oral activities should not entail any damaging neglect of the teaching of the written aspects of language. To develop the listening skills to understand and comprehend different accents.

• To adapt to present day scenario of business English which deals with a large area of in organizational and managerial communication including corporate communication, multi cultural communication, verbal and non verbal communication and public relation skills.
SECTION A

I Fundamentals of Communication

Definition and nature of communication, types of communication, process of communication, introduction to the 4 modes of communication.

Effective communication, the seven C’S in communication, barriers in communication.

Communication in organizations- kinds of network communication, informal communication network.

Non verbal communication, body language – correct use of body language and gestures, advantages and disadvantages of body language.


SECTION B

II Development of Communication Skills

1. Development of Writing Skills: Definition of writing -Importance of good writing – types of writing – basic requirements of coherent writing - faulty writing – fragmented sentences ,repetition -double negatives.

Organizing thoughts and ideas – preparation of rough outline -Use of connecting words – vocabulary for effective writing – variation. Content- importance of content – techniques to develop knowledge on various issues –illogical content material.


4. **Development of Listening Skills**: Definition of listening – importance of listening – types of listening – difference between a good listener and a faulty listener . Development of effective listening – barriers in effective listening strategies to increase listening efficiency. Audio visual practice for increasing listening efficiency.

### III Business English


### Reference Books

1. Communication Skills for Engineers and Professionals –P. Prasad
2. English – I for pre law – S.R.Myneni
4. Communication Skills – Leena Sen
5. High School English Grammar & Composition- Wren and Martin
7. Cambridge Grammar of English paperback with CDROM
AS103/203: Economics

Internal Assessment: 25 Total Credits: 2
Course Duration: 30 lectures of one hour each with 3 hourly lectures per week

Note: The question paper will be divided into section A and section B. Four questions are to set from each section. The students will be required to attempt 5 questions with at least two questions from each section.

PART A


2. Demand and supply: Classification of wants and their relative nature, meaning of demand, price elasticity of demand, factors affecting price elasticity of demand, income elasticity of demand, cross elasticity of demand, elasticity of supply, factors affecting elasticity of supply. (10)

PART B


Recommended Books:
BT101/201: Fundamentals of Bio-Engineering

Internal Assessment: 25  Total Credits: 2

Course duration: 30 lectures of one hour each with 3 hourly lectures per week.

Note: The question paper will be divided into section A and section B. Four questions are to set from each section. The students will be required to attempt 5 questions with at least two questions from each section.

SECTION A

Overview of Biotechnology  (2hrs)
To make students conversant with the current developments and further prospects of biotechnology.

Introduction to Life and biomolecules  (5hrs)
The basic unit of life-the cell, various organelles, their structure and functions, the cellular basis of life; correlation between the various structures and functions, building blocks for complex molecules.

Macromolecules-their structure and functions  (6hrs)
Configuration and Conformation, Carbohydrates, Amino acids, Proteins, Lipids, Purines, Pyrimidines, Porphyrins, Vitamins and Nucleic acids.

SECTION B

Anatomy and physiology  (8hrs)
Outline of the major biological systems the circulatory, nervous, endocrine and reproductive systems.

Bioinstrumentation  (9hrs)
Biosensors-concept and construction, construction and application of ECG, EEG, ultrasound, MRI etc; artificial limbs, microsurgical operations-role of bioengineer. Bioreactor design and operation.

**Books Recommended**

1. Neil A Campbell : Biology, Benjamin Cummings Company
3. Smith and Wood ; Molecular Biology and Biotechnology, Chapman and Hall.