SYLLABI
OF
B.E./ B.E.MBA (FIRST YEAR) COURSES
IN
Biotechnology
Computer Science & Engineering
Electronics & Communication
Electrical & Electronics Engineering
Information Technology
Mechanical Engineering
Civil Engineering

(2013-2014)
## OPTION I (FIRST SEMESTER)

<table>
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<tr>
<th>Theory Paper Code</th>
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Grand Total: 650

Total Credits: 25

Total hrs/wk: 29

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**Grand Total: 650**  
**Total Credits: 25**  
**Total hrs/wk: 29**
### OPTION II (SECOND SEMESTER)

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**ELECTIVE II (Branch Specific) (ONE TO BE CHOSEN FOR EACH SEMESTER)**

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SYLLABUS FOR
FIRST YEAR COURSES
IN
BE AND BEMBA
OF
ALL BRANCHES
AS 101 : Engineering Mathematics – I (Theory in First Semester)

Max (Univ. Exam) Marks : 50          Time of examination: 3hrs.
Internal Assessment : 50             Total Credits: 5

Course Duration: 45 lectures of one hour each with 4 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         Time of examination: 3hrs.
Internal Assessment: 50         Total Credits: 5

Course Duration: 45 lectures of one hour each with 4 lectures and 1 tutorial 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)
(Scope as in Chapter 1, Section 1.5, Chapter 2, 2.1 – 2.4, 2.9 – 2.10, 2.14 of Reference 1).

Laplace Transforms     (10 hrs)
(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 5).

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:
AS109/209: Environmental Education (Theory)

Max. Marks : 50                Time of examination: 1 hr.
Internal Assessment: 50              Credits: Audit Pass

Course Duration: 24 lectures of one hour each with 2 lectures per week

Note: The University Examination will consist of 50 multiple choice questions with each question carrying four choices. The paper set will uniformly cover whole of the syllabus. There will be no negative marking for wrong answers. The time of examination will be 1 hour.

General
Introduction, components of the environment, environmental degradation.

Ecology
Elements of ecology: Ecological balance and consequences of change, principles of environmental impact assessment.

Air pollution and control
Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures.

Water pollution and control
Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control.

Land Pollution
Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods.
Noise Pollution

Sources, effects, standards and control.

Books & References

AS107: Physics (Theory)

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

Time of examination: 3hrs.
Total Credits: 4

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.

OBJECTIVES OF THE SYLLABUS:

1. The main objective of this syllabus is to expose students to the basics of the physical concepts, which will provide deeper insight in understanding of engineering studies.
2. To awaken them to understand contemporary and latest developments in their fields of engineering and technology.
3. To make them capable of working in the inter-disciplinary areas which are fast becoming future prospects of technology.

Time distribution of Syllabus (Duration: 45 hours)

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<tr>
<td>Electromagnetic Wave Theory</td>
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<tr>
<td>Optics</td>
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<td>Quantum Physics</td>
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Waves and Oscillations (14 Hours)

SHM (Three Hours): Review of basic kinematics (displacement, velocity, acceleration, time period and phase of vibration) and dynamics (restoring force and energetics) of simple harmonic motion, differential equation of SHM, superposition of two SHM in one dimension, charge oscillations in LC circuits (ref. 1, Chapter 1)
Damped Oscillations (Three Hours): Concept and cause of damping, differential equation of a damped oscillator and different kinds of damping. Methods of describing damping of an oscillator - logarithmic decrement, relaxation time, quality factor, band width. Series LCR circuit as a damped oscillator. (ref.1, chapter 2)

Forced Oscillations (Three Hours): States of forced oscillations, differential equation of forced oscillator – its displacement, velocity and impedance, behaviour of displacement and velocity with driver’s frequency, Power, bandwidth, Quality factor and amplification of forced oscillator, resonance in forced oscillators, forced oscillations in series LCR circuit. (Ref.1, Chapter 3)

Coupled Oscillations (Two Hours): Basic idea of coupled oscillators, Stiffness coupled oscillators and inertia coupled oscillators, normal coordinates, degrees of freedom and normal modes of vibrations. (Ref.1, Chapter 4)

Wave Motion (Three hours): Wave equation and its solution, characteristic impedance of a string, reflection and transmission of waves on a string at a boundary, reflection and transmission of energy, the matching of impedances. (Ref 1, chapter 5)

Electromagnetic Wave (8 Hours)
Vector and Scalar fields, the concept of gradient, divergence and curl of a field, Gauss’and Stoke’s theorem. (Ref. 2, Chapter 1)
Maxwell’s equations in integral and differential form, application of Maxwell’s equations to propagation of EM waves in vacuum, transverse nature of EM waves (Ref.2, 12.1-12.5), propagation of EM waves in dielectric and conducting media, skin depth, impedance of a dielectric and conductor to EM waves, velocity of EM waves in a conducting medium and anomalous dispersion, reflection and transmission of EM waves at boundary, connection between impedance and refractive index. (Ref.1, Chapter 7)

Optics (11 Hours)
Polarization (Four Hours): Methods of polarization, analysis of polarized light, quarter and half wave plates, double refraction. (Ref. 3, 19.1 – 19.5, 19.7, 19.8)
Lasers (Two Hours): Elementary idea of LASER production, Helium-Neon, Ruby and semiconductor lasers, applications of lasers. (Ref.3, 23.1-23.6)

Fibre Optics (Three Hours): Basics of optical fibre - its numerical aperture, coherent bundle, step index and graded index fibre, material dispersion, fibre Optics sensors, applications of optical fibre in communication systems. (Ref. 3, 24.1 – 24.11)

Holography (Two Hours): Basic principle, theory and requirements. (Ref. 3: 18.1-18.4)

QUANTUM PHYSICS (12 hrs)

Wave-Particle Duality (Six hours): Black body radiation distribution and Planck’s radiation formula, photoelectric effect, x-rays, Compton effect (Ref 4: 16.2, 3.1-3.3, 3.5), De-Broglie’s waves and its velocities, position–momentum and time-energy uncertainty principles and their applications (Ref 4: 4.1-4.5, 4.6, 4.7).

Schrodinger’s Equation and its Applications (Six Hours): Time dependent and independent Schrodinger’s equation, Properties of well-behaved wave function, probability current, operators and their expectation values. (Ref 4: 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, harmonic oscillator (Ref 4: 8.1- 8.7)

Recommended Books:
2. Introduction to Electrodynamics (3rd Edition, Pearson Education) – D.J. Griffiths
3. Optics – Ajoy Ghatak
4. Perspectives of Modern Physics – A. Beiser
**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.
AS 108/208: MATERIALS SCIENCE (Theory)

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

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.

Section A
STRUCTURE OF SOLIDS (10 hours)

1) Chemical Bonding (2 hrs): Bonding forces and energies, primary bonding (Ionic bonding, covalent bonding, metallic bonding), secondary bonding (Van Der Waals bonding), molecules. (Ref. 1: 2.1 – 2.8)

2) Crystal Structure (4 hrs): Space lattices and their symmetries, crystal structures (cubic and hexagonal cells), assignment of coordinates, directions and planes in crystals, linear, planar and space densities in crystals, close packed morphology (Hexagonal and cubic close packing), single and polycrystalline structures (Ref.1, 3.1 – 3.15), interstitial spaces (trigonal, tetrahedral and octahedral voids), Structure of ceramics (NaCl, Zinc blende, silica and silicates, diamond crystal, Graphite, Fullerenes and carbon nanotubes), (Ref.1, 12.1 - 12.4), polymers (Ref. 2, 5.6 – 5.8)

3) Structure Determination (2 hrs): Diffraction of X-rays by crystals, Bragg treatment of X-ray diffraction by crystals, Powder method for study of X-ray diffraction pattern by crystals, structure determination, Laue method and rotating crystal method (brief) (Ref.2. 3.4 – 3.6)

4) Crystal Imperfections (2 hrs): Point, line, surface and volume imperfections, dislocations and their geometry (Ref.1, 4.1 – 4.8) , Imperfections in ceramics (Frenkel defect, Schottky defect, non-stoichiometric defects), impurities in ceramics. (Ref. 1: 12.5)
**Diffusion and Mechanical properties (12 hours)**

1) **Diffusion (3 hrs):** Diffusion mechanisms, steady state diffusion, non-steady state diffusion, factors affecting diffusion (Ref. 1, 5.1 – 5.6), applications based on diffusion (corrosion resistance of Duralumin, carburization of steel, decarburization of steel, doping of semiconductors), Kirkendall effect (Ref.2, 8.3, 8.4).

2) **Elastic, Anelastic and Viscoelastic Behaviour (2 hrs):** Elastic behaviour and its atomic model, rubber like elasticity, anelastic behaviour, relaxation processes, viscoelastic behaviour, spring-dashpot model. (Ref.2, 10.1 – 10.5)

3) **Plastic Deformation (2 hrs):** Dislocations and plastic deformation, characteristics of dislocations, slip systems, slip in single crystals, plastic deformation of polycrystalline materials (Ref.1, 7.1 – 7.6)

4) **Fracture, Fatigue and Creep (3 hrs):** Fracture (Ductile and brittle fractures), principles of fracture mechanics, fracture toughness, fracture safe designs, Cyclic stresses, S-N curve, factors that affect fatigue life, creep (Ref.1, 8.1 – 8.5, 8.7, 8.8, 8.11, 8.12, 8.14, 8.15, 8.17).

5) **Strengthening mechanisms (2 hrs):** Mechanisms of strengthening in metals (grain size reduction, solid-solution strengthening, strain hardening), recovery, recrystallization and grain growth (Ref.1, 7.1 – 7.13)

**SECTION B**

**PHYSICS OF MATERIALS (22)**

**Metals:** Free electron theory, electrical properties, thermal properties, thermoionic emission, motion in magnetic field (cyclotron resonance and Hall effect), Zone theory. (Chapter 10, Ref 4; Ref 3: 4.1-4.13)

**Dielectric Materials:** Review of basic formulas, dielectric constant and polarizability, sources of polarizability, classical treatment of dipolar, ionic and electronic polarizability, piezoelectricity, ferroelectricity. (Ref 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 (Ref 3: 9.1-9.11)

**Superconductivity:** Zero resistance, occurrence of superconductivity, Meissner effect, critical field, thermodynamics of superconducting transitions, electrodynamics of superconductors, qualitative idea of BCS theory. (Ref 3: 10.1-10.7)

**Semiconductors:** Intrinsic and extrinsic semiconductors, conductivity of semiconductors and its temperature dependence, mobility of charge carriers, lifetime of minority carrier, junction properties (metal-metal, metal-semiconductor and pn junctions). (Ref 4: Chapter 12)

**Nanotechnology:** Introduction, Synthesis of Nanoparticles: Mechanical Method, Sputtering, Chemical Vapour Deposition, Sol-gel Technique, Applications of Nanotechnology

**References:**

3. Elementary Solid State Physics (Pearson Education (LPE) ) - M.A. Omar
ME153/253: Engineering Graphics (Practical)

Max. Marks : 50                    Total Credits : 3

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

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
**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**


**Catalysis** (6 hrs) Catalysis and general characteristics of a catalytic reactions, homogenepus 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-granular, stress corrosion). Factors influencing corrosion, Prevention of corrosion.

**SECTION B**

**Polymers** (5 hrs) General introduction, classification of polymers, Mechanism of addition and condensation polymerization. Idea of number average and weight average molecular masses of
polymers. Properties and uses of polystyrene, polyester, polyamide, epoxy, phenol-formaldehyde and silicon resins.

**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 two 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 R_f 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 2 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.
ME152/252: Workshop Practice

Marks: 50                                      Total Credits : 2

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

Practice of basic exercises related with different shops. In addition exercises relevant to the branch of study be taken up in one of the semesters.
ELECTIVE I SUBJECTS
AS106/206: Communication Skills

Max. Marks : 50                        Time of examination: 2hrs.
Internal Assessment: 50              Audit Pass

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, multicultural 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.


3. **Development of Speaking Skills:** Public speaking – formal speaking— audience analysis – effective use of voice & body language – importance of logic - importance of humour & creative art of expression – importance of confidence building - group discussion –presentation skills- seminar - interview skills development – telephone etiquettes – opinion based speaking.

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

Max. Marks : 50
Internal Assessment: 50
Time of examination: 2hrs.
Total Credits: Audit Pass

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:
ELECTIVE II SUBJECTS
EC102/202: 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 4 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

Semiconductors: (5hrs) Intrinsic and extrinsic semiconductors, conductivity of semiconductors and its temperature dependence, mobility of charge carriers, lifetime of minority carrier.


Bipolar Junction Transistor-1 (10hrs) Junction transistor, transistor current components, current gain, transistor as an amplifier, common emitter, common base, common collector configurations, Input & output characteristics in CE, CB & CC configurations, photo transistor & its characteristics, Unijunction transistor & its characteristics.

PART B

Bipolar Junction Transistor-2 (10hrs) h-parameters, Graphical analysis of CE, CB & CC configuration, two port devices and hybrid model, Concept of biasing & biasing of BJT circuits, Operating point, bias stability, stabilization against variation in Ico, Vbe, and β, thermal run away, thermal stability.

Field Effect Transistor (10hrs) Junction Field Effect Transistors, JFET characteristics, pinch off voltage and equivalent circuit, MOSFETs - their modes of operation and characteristics, equivalent circuit.
**Logic Gates & Flip Flops**  *(5hrs)* Binary arithmetic, Logic-positive and negative logic, basic and universal logic gates. Concept of flip-flops, RS, D, JK and T types.

**Recommended Books:**

1. Integrated Electronics, Millman & Halkias (Mc-Graw Hill)
2. Microelectronics Circuits, AS Sedra & KC Smith (OXFORD)
3. Electronics Devices & Circuit Theory, RL Boylestad & L Nashelsky (PHI)
4. Electronic Circuit Analysis & Design, Donald A. Neamen (TMH)
EC152/252: Basic Electronics Practical

Marks: 50          Total Credits : 2

Note: The candidate will attend a laboratory session of 2 hours weekly.

List of Experiments
1. Study the forward and reversed biased diode characteristics.
2. Study the forward and reversed biased Zener diode characteristics.
3. Study the LED characteristics.
4. Study the Solar cell characteristics.
5. Study the CB transistor characteristics.
6. Study the CE transistor characteristics.
7. To Study the data sheets of Logic Gates.
8. To Study the data sheets of Flip-flops.
10. To study the characteristics of FET.
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 4 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 2 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.
BT102: Basic Biology and Biotechnology (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: The question paper will be divided into section A and section B. Four questions to be set from each section. The students will be required to attempt 5 questions with at least two questions from each section.

Objective: To make students aware of the fundamentals of bioengineering with special emphasis on origin of different forms of life and its propagation and biomolecules which constitute it. Emphasis is also given on making students aware of various tools and processes involved in bioengineering along with their applications.

Section A
Introduction to Biotechnology: definition, scope and application of biotechnology (2)
Origin of Life: theories of evolution, chemical evolution, organic evolution, Oparin-Haldane hypothesis, Miller’s experiment (4)
Cell Biology: prokaryotic and eukaryotic cell (plant and animal cell), various cell organelles, their structure and functions (9)
Cell Division: stages of mitosis and meiosis (3)
Micro-organisms in Biotechnology: beneficial and harmful micro-organisms and their applications (3)

Section B
Introduction to Biomolecules: interactive forces in biomolecules, role of water in biological systems, carbohydrates, proteins, lipids, nucleic acids, porphyrins, vitamins, enzymes (12)
Basic Tools in Biotechnology: spectrophotometer, pH meter, autoclave, centrifuge, incubator, lyophilization, cryopreservation  

Overview of Bioremediation: definition, basic principle and strategies of bioremediation  

Books Recommended:  
1. Campbell NA and Reece JB: Biology, Benjamin Cummings Company, 8th edition  
BT 152: Basic Biology and Biotechnology (Practical)

Marks: 50          Total Credits : 2

Note: The candidate will attend a laboratory session of 2 hours weekly.

1. To measure the pH of a solution.
2. To prepare phosphate buffer solution
3. To test the presence of carbohydrates in a given sample by Molisch’s test/Anthrone test
4. To test the presence of proteins in a given sample by Ninhydrin test/Biuret test
5. Estimation of DNA in a given sample by diphenylamine reaction
6. Estimation of RNA in a given sample by orcinol method
7. Preparation and study of wet mounts of different microorganisms
Objective

To familiarize students with basic biotechnology and its application to bioengineering. Students will also get an overall idea of various technological aspects exploited in product development for societal benefits.

Section A

Types of Animal Tissues: basic structure and function of epithelial tissue, connective tissue, muscular tissue and nervous tissue

Basic Genetics: concept of gene and allele, Mendelian and non Mendelian inheritance

Human Anatomy and Physiology: outlines of the major biological systems – digestive, circulatory, nervous, endocrine, and reproductive system

Section B

Application of Computers to Biology: concepts of bioinformatics, types of databases, biochips

Introduction to Genetic Engineering: tools and applications

Concepts in Bioengineering: biosensors-concept and construction, bioreactors-design and operation, biomedical instruments-construction and applications of ECG, EEG, MRI, ultrasound

Biosafety: concept of biosafety, need and application of biosafety in laboratories and industries, international and national norms regarding biosafety, bio-medical wastes, transportation of biological materials
Books Recommended:

1. Campbell NA and Reece JB: Biology, Benjamin Cummings Company, 8th edition

BT 252: Fundamentals of Bio-Engineering (Practical)

Marks: 50  Total Credits: 2

Note: The candidate will attend a laboratory session of 2 hours weekly.

1. To verify the validity of Beer Lambert law using a spectrophotometer
2. To prepare the standard curve of Bovine Serum Albumin (BSA)
3. To observe epithelial tissue under a microscope
4. To study the working and components of a CO$_2$ incubator
5. To study the working and components of an autoclave
6. Acquaintance to NCBI database
7. To learn the preparation of glycerol stocks
8. Case study of Bt cotton
Part A – Statics


5. **Virtual Work** – Definition of Work and Virtual Work, Principle of Virtual Work for a Particle and a Rigid Body, Principle of Virtual Work for a System of Connected Rigid Bodies, Conservative Forces,
6. **Center of Gravity, Centroid, Moments of Inertia** – Center of Gravity and Center of Mass for a System of Particles, Center of Gravity and Center of Mass and Centroid for a Body, Composite Bodies, Theorems of Pappus and Goldinus, Resultant of a General Distributed Force System, Fluid Pressure. Definition of Moments of Inertia for Areas, Parallel-Axis Theorem for an Area, Radius of Gyration of an Area, Moments of Inertia for an Area by Integration, Moments of Inertia for Composite Areas, Product of Inertia for an Area, Moments of Inertia for and Area about Inclined Axes, Mohr's Circle for Moments of Inertia, Mass Moment of Inertia.

**Part B– Dynamics**


**Textbooks** -

1. Hibbeler – Statics & Dynamics (11\textsuperscript{th} ed.) - Pearson Publishers
3. Merriam and Kraige – Statics & Dynamics (5\textsuperscript{th} ed.) - Wiley and Sons Publishers
4. Pytel and Kiusalaas – Statics and Dynamics (3\textsuperscript{rd} Ed.) – Cengage Learning

1. **Fundamentals of Statics** - Accumulation and resolution of forces with force Parallelogram. Equilibrium of forces. Law of levers, determination of moments and equilibrium of moments.

2. **Inclined Plane and Friction** - Dynamic friction as a function of the normal force, contact area and surface properties of the friction body. Determination of the friction coefficient. Rolling friction.

3. **Pulley Blocks** - Familiarisation with the construction and mode of operation of pulley blocks with 4 pulleys and with 6 pulleys; differential pulley block. The principle of "simple machines", mechanical advantage, velocity ratio and efficiency.

4. **Forces in a Simple Bar Structure** – Measurement and Calculation of bar forces by the method of joints. Comparison of measurement result and calculation also use graphical method.

5. **Equilibrium of Moments on a Two Arm Lever** - Fundamentals of the equilibrium of moments: applied forces, generated moments and equilibrium. Action of forces dependent on the lever arm.

6. **Crank and Connecting Rod** - Conversion of smooth rotary motion into reciprocating motion.

7. **Wheel and Axle** - Demonstration of the formation of an equilibrium of moments in static systems.

8. **Drives** - Function and differences between belt drives, wheel and disc drives, and gear trains.

9. **Inertia in Rotational Motion** - Determination of the moment of inertia of various bodies, Influence of the rotating mass on the moment of inertia. Influence of the radius of rotation on the moment of inertia. Comparison of the moments of inertia of solid and hollow cylinders of the same...
weight and outside diameter.

10. Centrifugal Force - Dependency of centrifugal force on rotational speed, rotating mass, and radius of rotation

**ME204: Engineering Mechanics II (Theory)**

Max. (Univ. Exam) Marks: 50  
Time of examination: 3hrs.

Internal Assessment: 50  
Total Credits: 4

Note: The examiner shall set 8 questions i.e. 4 from each part and students shall be required to attempt a total of 5 questions with at least 2 questions from each part.

**PART-A**

1. **Introduction:**
   - Introduction to basic features of Matlab and Matlab desktop

2. **Basic Programming Operations:**
   - Script M-files, Arrays and array operations, Multidimensional arrays, Numeric data types, Cell arrays and structures, Character strings, Relational and logical operations, Control flow

3. **Advance Programming Operations:**
   - Functions, M-file debugging and profiling, File and directory management, Set, bit and base functions, Time computations

4. **Basic Mathematical Applications:**
   - Matrix Algebra, Data analysis, Data interpolation, Polynomials, Cubic splines
PART-B

5 **Advance Mathematical Applications:**
Fourier analysis, Optimization, Integration, Differentiation, Differential equations

6 **Basic Graphical Operations:**
Two-dimensional graphics, Three-dimensional graphics, Use of colors and light in graphics, Generation of images

7 **Advance Graphical Operations:**
Development of movies and sounds, Printing and exporting graphics, Handling graphics, Development of graphical user interfaces

8 **Classes and Interfacing:**
Matlab classes and Object-Oriented Programming, Matlab programming interfaces

**Books Suggested:**

1 Mastering MATLAB 7
   D. Hanselman and B. Littlefiels, Pearson Education, New Delhi, 2009

2 Getting started with Matlab: A quick introduction for scientists and engineers
   Rudra Pratap, Oxford University Press, USA, 2009.

3 Programming in MATLAB for Engineers

4 MATLAB An Introduction with Applications
   Amos Gilat, John Wiley and Sons, New Delhi, 2009

5 **Essential Matlab for Engineers and Scientists**
   Brian H Hahn, Elsevier India
ME254: Engineering Mechanics II (Practical)

Marks: 50

1. Basics such as command window, workspace, m-files, clc, clear, who, save, load, format, ;, ..., if, else, switch, for, while, continue, break, try, catch, return, ctrl+C, entering matrices, transpose, subscripts, colon operator, modifying or deleting rows and columns, addition, subtraction, matrix multiplication, element-by-element multiplication / division / left-division, sum, diag, eye, zeros, ones, rand, randn, det, inv, variables, numbers, strings, numeric operators, relational operators, functions.

2. 2-D and 3-D plotting. Modifying graph properties such as title, labels, limits, colors, line-types, line-weights, lights etc. using graphic handles. Exporting graphs as TIFF, PDF and JPEG files.


4. Curve fitting and simple regression analysis of some simulated data.
5. Use of FFT method to find the frequency components of a signal buried in a noisy time domain signal.


7. Differentiation and integration of a function using symbolics.

8. Solution of an ordinary differential equation and development of a corresponding GUI.

COURSE NAME : STRENGTH OF MATERIALS
COURSE NO. : CIV-101      Max. Marks:

SECTION A

Concept of Equilibrium
Load, reaction; General equilibrium equations Concept of free body diagrams, Action and displacement

Simple Stress and Strains
Introduction; Concept of stress and strain; Stress-strain curves for ductile, brittle materials; Generalized Hooke’s law, Elastic constants, relations between various elastic constants and its use. Lateral strain, volumetric strain, poisons ratio.

Theory of pure bending
Derivation of flexural formula for straight beams, bending stress calculation for b beams of simple and built up sections, flitched beams

SECTION B

Complex stress and strains
Introduction; Normal stress, tangential stress; Rectangular block subjected to normal stress along and across two planes, combination of normal and tangential stress; Concept of principal stress and its computation; Mohr circle; Principal strains, computation of principal stresses from the principal strains.
Shear force and Bending moment diagrams
Introduction to the concept of reaction diagrams—shear force and bending moment; Role of sign conventions; Types of load, beams, supports; Shear force and bending moment diagrams: simply supported, overhang and cantilever beams subjected to any combination of point loads, uniformly distributed and varying load, and moment; Relationship between load, shear force and bending moment.

Failure theories

Text Books:

BOOKS:
5. Basic Structural Analysis : C.S. Reddy, TMH
6. Theory of Structures : S. Ramamurtham, TMH

STRENGTH OF MATERIALS LAB
CIV-151

Max. Marks :
1. Draw Stress Strain curve for ductile material in tension.
2. Draw Stress Strain curve for Brittle material in tension.
3. To determine the impact strength by Izod and Charpy test.
4. To determine the hardness of the given material by Rockwell hardness testing machine.
5. To determine the hardness of the given material by Vicker’s hardness testing machine.
6. To determine the stiffness of a spring on a spring tester.
7. To determine the fatigue strength of the material.
8. To study the creep behavior of material on creep testing machine.
COURSE NAME : BUILDING DRAWING
COURSE NO. : CIV-201

Max. Marks :

SECTION A

ELEMENTS OF ARCHITECTURAL DESIGN
Line direction. Shape, size, texture, value and color, balance, scale and proportion.

PRINCIPLES OF ARCHITECTURAL DESIGN
Repetition, gradation, harmony, contrast and unity, creation of 2 D and 3 D compositions.

BUILDING DRAWINGS
Building layout, Architecture Structural working drawings, Modular co-ordination and drawing on modules, Building byelaws.

INTRODUCTION TO AUTOCAD
Introduction, Draw command, modify command

SECTION B

PLUMBING FOR BUILDINGS
Introduction to plumbing services, water distribution system, material for service pipes, service connection, size of service pipe, water meter, valves, storage tanks, house drainage, pipes and traps.

BUILDING PLANS
Introduction, types of plans, conventional symbols for construction material, doors and windows, sanitary items, electrical items, illustrative plans and cross sections.

EARTHQUAKE RESISTANT BUILDINGS
Introduction, cause of earthquake, earthquake terminology, seismic zone, seismic effects on building, design approach for earthquake resistant building, importance of architectural feature and structural shape, importance of ductility in seismic design, earthquake resistant masonry building, and recommendation of Indian standard code IS 4326:1993

Text Books:
Reference Books

BUILDING DRAWING LAB
CIV- 251
Marks:

A plan of building consisting two stories with three/four rooms:

1. Plan, Elevations & Section (Modular).
2. Site Plan (Bye laws application).
5. Roof & floor – details in construction.
6. Stair case details.