

FIRST YEAR SYLLABUS

MAT 101 Engineering Mathematics – I [3 1 0 4] 48 hrs

Differential Calculus:

- a) n^{th} derivatives of standard functions: e^{ax} , $(ax+b)^m$, $(ax+b)^{-1}$, $\log(ax+b)$, $\sin(ax+b)$, $\cos(ax+b)$, $e^{ax}\sin(bx+c)$ and $e^{ax}\cos(bx+c)$ and relative problems. Leibnitz's theorem with problems. (4)
- b) Polar curves:
Angle between radius vector and the tangent: $\tan f = (rdq/dr)$. Relative problem to find f .
Angle between two polar curves. Orthogonal curves etc. (2)
- c) Derivatives of arcs / radius curvature/ Evolute:
Expressions for derivative of arcs of cartesian, parametric & polar curves with relative problems.
Curvature, radius of curvature r for the curves $y = f(x)$; $x = f(t)$, $y = F(t)$ and $r = f(q)$ at any point on them and problems involving r . (2)
Evolute of parabola, ellipse, hyperbola, rectangular hyperbola, catenary, tractrix etc., circle of curvature. (2)
Mean value theorem / Indeterminate forms :
Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's mean value theorem with relative problems. Indeterminate forms. (5)
- Partial Differentiation:
Definition of partial derivative, Euler's theorem on homogeneous functions, relative problems, total derivative, derivatives of composite & implicit functions, relative problems. Errors and approximations with problems. (3)

Integral Calculus:

- a) Reduction formulae for $\int \sin^n x dx$, $\int \cos^n x dx$,
 $\int \sin x \cos^n x dx$,
 $\int \sin^m x \cos^n x dx$, $\int \sin^m x \cos^n x dx$, (m & n are +Ve integers) and $\int \tan^n x dx$ with problems. (3)
- b) Tracing of curves/ applications of integral calculus:
Tracing of cartesian, parametric & polar curves such as folium of descartes, lemniscate of Bernoulli, strophoid, witch of Agnesi, astroid, catenary, cissoid, cardioid, cycloid, 3 & 4 leaved roses etc.
Applications of integral calculus areas, lengths and volume of revolution of simple curves. (11)

Infinite Series:

Definition regarding convergence, divergence of infinite series. Tests: Comparison test, ratio test, Cauchy's root test, Raabe's test, integral test, alternating series, Leibnitz's

theorem, absolute and conditional convergence with problems. Taylor's and Maclaurin's expansion of functions and problems. (6)

Analytical Solid Geometry

Direction cosines, planes, straight lines, spheres, right circular cones, right circular cylinders. (8)

References :

1. Shanti Narayan- 2002- Differential Calculus, Shyam Lal Charitable Trust, Delhi.
2. Shanti Narayan - 2005-Integral Calculus, S. Chand & Co., Delhi.
3. B.S. Grewal-2006-Higher Engineering Mathematics, Khanna Publishers, Delhi.
4. C. B. Thomas - 1986-Calculus and Analytical Geometry, Narosa Pub., Delhi.
5. N. Piskunov - 1981-Differential Calculus, Vol. I and II, Mir Pub.

CIE 101 ENGINEERING MECHANICS [3 1 0 4]

1. Introduction: Aims and objectives of the course. Basic concepts, Newton's Law of motion, units. (2)
2. Force systems: Rectangular components of force, moment, couple, and resultant (for both two dimensional and three dimensional force Systems). (8)
3. Equilibrium: Conditions of equilibrium, determination of unknown forces using the conditions of equilibrium (for both two dimensional and three dimensional force systems). Systems with friction (two dimensional force systems only). (8)
4. Analysis: Plane trusses by method of joints and method of sections. (5)
5. Centroids and Moments of inertia of simple and composite areas. (8)
6. Kinetics of particles : Force acceleration, Newton's second law, D'Alembert's principle, work - energy, and impulse momentum methods of analysis. (15)
7. Collision of elastic bodies: Coefficient of restitution, central impact, oblique impact. (4)

References:

1. Meriam & Kraige, Engineering Mechanics, John Wiley & Sons, 2004.
2. Irving H. Shames, Engineering Mechanics, Prentice Hall of India, 1996.
3. Beer & Johnston, Vector Mechanics for Engineers, Tata McGraw-Hill, 2004.
4. Singer F.L., Engineering Mechanics, Harper & Row, 1994.
5. K.L. Kumar, Engineering Mechanics, Tata McGraw-Hill, 2000.
6. Bhavikatti & Rajasekharappa, Engineering
7. Mechanics, New Age International, 2006.
8. Rajput R.K., A text book of Engineering Mechanics, Dhanpat Rai Publishers, 2004.

ELE 101/102 BASIC ELECTRICAL TECHNOLOGY [3 1 0 4]

Power Generation: Thermal, Hydel and Nuclear; Renewable Energy Sources; Power generation in Indian context. (1)

Electrical Power System: Generation, Transmission, Distribution, Voltage levels, Overhead lines and under ground cables, Domestic, Commercial and Industrial loads. (2)

Electric Circuit Elements: Linear/ non-linear, passive/ active and unilateral and bilateral circuit elements.

Sources : Ideal voltage source, practical voltage source, ideal current source, practical current source, source transformation, controlled sources.

Resistor: Resistance, linear and non-linear resistors, resistors in series, resistors in parallel, current division, power consumed by a resistor.

Capacitor: Capacitance, equivalent capacitance of capacitors in series, voltage division, capacitors in parallel, growth of voltage in a capacitor, time constant, discharge of voltage in a capacitor, energy stored by a capacitor.

Inductor: Inductance, self induced emf, growth of current in an inductive circuit, time constant, decay of current in an inductor, energy stored by an inductor, inductors in series, inductors in parallel, mutual inductance, coupling coefficient, Dot rule, coils in series-series aiding, series opposition, Analysis of coupled circuits.

Resistive networks : Analysis by branch current method, mesh current method, node voltage method, star-delta and delta star transformations, network reduction technique (11)

Electromagnetism :Magnetic flux, flux produced by a current carrying conductor, magnetic field produced by a solenoid, Force acting on a conductor, Flux density, fundamental equation for force acting on a conductor, Fleming's left hand rule, Faraday's laws, fundamental equation for induced emf in a conductor, Flemings right hand rule, Lenz's law, Induced emf in a coil. (2)

Magnetic Circuits:mmf, magnetic field strength, permeability, reluctance, permeance, analogy with electric circuits, series, parallel and series-parallel magnetic circuits, Iron losses: hysteresis and eddy current losses, B-H loop. (2)

Single-phase AC Circuits : Alternating voltages and currents, generation of single phase alternating voltage, average value and rms value of periodic sinusoidal and non-sinusoidal wave forms, form factor.

Representation of time-varying quantities as phasors; the operatorj; Representation of complex quantities; Addition, subtraction, multiplication and division of phasors.

Basic ac circuits, sinusoidal alternating current in a pure resistor, pure inductor and a pure capacitor, waveforms of voltage, current and power, phasor diagram, inductive and capacitive reactances, mechanical analogy to inductor and capacitor.

Steady-state analysis of RL, RC and RLC circuits, concept of impedance and phasor diagram, expression for average power, power factor, parallel ac circuits, conductance, susceptance and admittance, analysis of series parallel circuits and phasor diagrams, active power, reactive power, and apparent power, complex power and power triangle, improvement of power factor. (10)

Resonance : Series and parallel resonance, variation of reactance/susceptance and impedance/admittance with frequency, mechanical analogy of resonant circuit, Q factor, half-power frequencies, bandwidth, relation between Q factor and bandwidth. (2)

Three-phase AC Circuits: Generation of 3-phase balanced sinusoidal voltages, waveform of 3-phase voltages, star and delta connections, line voltage and phase voltage, line current and phase current, analysis of 3-phase circuit with balanced supply voltage and with star/delta connected balanced and unbalanced loads, 3-phase 4-wire system, 3-phase 3-wire system, phasor diagram of voltages and currents, power, measurement of active power, two-wattmeter method with unbalanced and balanced loads (8)

Measuring Instruments : Constructional details and principle of operation of PMMC instruments, moving iron instruments, dynamometer-type wattmeter and induction type energy meter. (2)

Transformers : Types, constructional features, principle of operation, equation for induced emf, transformation ratio, ideal transformer, equivalent circuit, transformer under no-load and loaded conditions, applications, principle of auto-transformer. (4)

Three-phase Induction Motors: Types, constructional details, production of rotating magnetic field, synchronous speed, principle operation, slip, speed of rotor, frequency of rotor current, equivalent circuit of rotor, starting, applications. (4)

Single-phase Induction Motors: Construction, Double revolving field theory, principle of operation, capacitor-start induction motors, and applications. Stepper motors. (2)

References :

- 1.Hughes E., Electrical and Electronic Technology (8e), Pearson Education, 2002
- 2.Nagasarkar T.K. & Sukhija M.S., Basic Electrical Engineering, OUP 2005
- 3.Kothari D. P. & Nagarath I.J., Basic Electrical Technology, TMH 2004

ENG 101/102: COMMUNICATION SKILLS IN ENGLISH [2 1 0 3] (First Year BE/BArch – common to all Branches) (May 09)

1. Phonetics (4 Hours)
 - Transcription
 - Word accent
2. Common Errors in English (5 Hours)

- Subject Verb in English
 - Use Verb agreement
 - Use of Tenses/Sequence of Tense
 - Propositions
 - Punctuations
 - Special Usages.
3. Creative Writing –Essay (3 Hours)
- Types of Essays
 - Argumentative Essay (300-400 words)
4. Reading comprehension (2 Hours)
5. Non detailed Text* - Critical evaluation (7 Hours)
6. Confused pair of words
7. Idiomatic expressions
8. Antonyms and Synonyms (3 Hours)
- (6,7 and 8 are based on vocabulary used in the non-detailed text)
9. Tutorials (12 Hours)
- Group Discussions
 - Presentations
 - Listening Skills.

Non-detailed text*: English Today-a course in reading and writing, Foundation Books Pvt. Ltd., Cambridge House, New Delhi, 2005.

References:

1. Green David Contemporary English grammar, structures and composition: Macmillan Publications.
2. Thmpson A J,Martinet AB,A Practical Grammar Oxfoord University Press.
3. Turton N D,Heaton J B,Longman Dictionary of Common errors 1998
4. McCarthy Michael English Idioms in Use, Cambridge University Press,2002.
5. Jones Daniel An Outline of English Phonetics Cambridge University Press.
6. Jones Daniel English Pronouncing Dictionary London: ELBS
7. Tickoo Champa, Sasikumar Jaya Writing with a Purpose Oxford University Press
8. Quirk et.el University Grammar of English ELBS

CHM 101/102 ENGINEERING CHEMISTRY [3 0 0 3]

Electrochemistry:

Electrochemical cells- galvanic cell- emf of a cell and its measurements, standard cell- Weston cadmium cell. Single electrode potential – Origin, evaluation and sign of electrode potential – Nernst equation for electrode potential, derivation from thermodynamic concepts, energetics of cell reactions (S and H), representation of an electrode and a cell. Liquid junction potential and function of a salt bridge. Calculation of emf from electrode Potentials. Construction, working and applications of Calomel electrode, H₂ electrode& Glass electrode. Concentration cells (emf and working) (9)

Battery technology:

Commercial cells - primary and secondary cells - Dry cell, lead storage battery, nickel - Cadmium cell. Fuel cells-H₂-O₂ fuel cell, Methanol-O₂ fuel cell. (3)

Corrosion and its control:

Definition, Electrochemical theory of corrosion, Factors affecting corrosion rate. Types of corrosion - Galvanic, differential aeration, water line, pitting, stress, caustic embrittlement, passivity. Galvanic series. Corrosion control by- proper material selection and design, cathodic protection, anodic protection, inhibitors, protective coating - Metal coating (galvanization and tinning). (8)

Metal finishing:

Polarization, decomposition potential and over voltage. Characteristics of a good deposit, factors influencing the nature of deposit, Methods of cleaning the metal surface, Electroplating of chromium. Electroless plating- Electroless plating of copper and plastics. Printed circuit board. Comparison between electroless and electroplating. (4)

Chemical Fuels:

Introduction, classification, calorific value and its determination - Bomb calorimeter and Boys calorimeter.

Solid Fuels: Coal and its analysis - proximate and ultimate. (8)

Liquid Fuels: Petroleum - cracking- catalytic cracking, reforming of petrol, knocking, octane number, anti-knocking agents, unleaded petrol.

Gaseous Fuels: LPG, Water gas, producer gas.

High Polymers:

Definition, classification based on- origin, thermal behavior, polymerization reactions, applications. Functionality, degree of polymerization, tacticity, types of polymerization- addition and condensation. Co-polymerization - Alternating, random, block and graft.

Mechanism of free radical polymerization Bulk, solution, suspension and emulsion polymerization. Thermoplastic and thermosets. Glass transition temperature, effect of structure on properties of polymers - strength, plastic deformation, crystallinity, elasticity and chemical resistance. Molecular weights of polymers - Number average and weight average. Preparation, properties and uses of Teflon, Nylon 66, P-F resin, Epoxy resin (8)

7 Elastomers:

Natural rubber- isomers, vulcanisation & compounding of rubber, Synthetic rubber- Preparation, properties and applications of SBR, and silicone rubber. Reclaimed rubber. (2)

References:

1. J.C. Kuriacose, J. Raja ram. Chemistry in Engg. and Technology, Volume I/II Tata McGraw – Hill Publishing Company Limited, New Delhi 1988.
2. Jain P.C. and Monika Jain, Engg. Chemistry, Dhanpat Rai and Sons, Delhi, Revised, 6th Edn. 1996.
3. Puri B.R. Sharma L.R. And Madan S. Pathania, Principles of Physical Chemistry.S.N. Chand and Co. Jalandhar, 31st Edn. 1990.
4. Agarwal C.V. Chemistry of Engg. Materials. Tata Publications, Varanasi, 6th Edn. 1979.

CSE 101/102 PROBLEM SOLVING USING COMPUTERS

[3 0 0 3]

1. Introduction To Computers:

Block diagram of a computer, computer memories, operating system basics, working with MS-Windows environment. (2)

2. Algorithms and Flowcharts:

Definitions, Symbols of Flowcharts, Examples of Flowcharts and algorithms for a variety of problems ranging from the reasonably simple ones such as finding the largest of 3 nos., largest of “n” numbers to relatively complicated problems such as Matrix operations including matrix. (4)

3. C++ Fundamentals:

The C++ character set, identifiers and keywords, data types, variables, declarations, statements, C++ program structure. Simple I/O operations. (3)

4. Operators And Expressions:

Operator precedence and associativity, arithmetic operators, relational operators, logical operators, increment and decrement operators, bitwise operators, assignment operators, type conversions. (4)

5. Flow Of Control:

Statements and blocks, branching control, repetition control, break and continue statements. (6)

6. Derived Data Types:

1-D arrays, 2-D arrays, strings, structures, pointers (pointers to simple variables, pointers to arrays, basic operation on pointers, pointers to strings), Structures & Unions, pointers to structures and their use. (8)

7. Functions:

Modular programming, library functions and user- defined functions, function declaration, definition and call, parameter passing techniques, function overloading, default arguments, inline functions. I/O format specifications (7)

8. Introduction To Object Oriented Programming:

Procedure oriented programming versus object oriented programming, basic concepts of object oriented programming, benefits of object oriented programming, C++ as object oriented programming language. (2)

References:

1. Programming in ANSI C, 2nd Edition, - E. Balaguruswamy, Tata McGraw Hill.
2. Object Oriented Programming with C++: - 2nd edition - E. Balaguruswamy Tata McGraw Hill.
3. C++ : The Complete Reference 4th edition - Herbert Schildt, Tata McGraw Hill.
4. Object Oriented Programming with Turbo C++ - Robert LaFore, Galgotia Publications, 2002.

CIE-103/CIE 104 ENVIRONMENTAL STUDIES

[3 0 0 3]

The Multidisciplinary nature of environmental studies:

Definition, scope and importance Need for public awareness.

Natural Resources:

Renewable and non-renewable resources:

Natural resources and associated problems.

- a) Forest resources: Use and over-exploitation, deforestation. Case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
 - b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
 - c) Mineral resources: Use and exploitation, Environmental effects of extracting and using mineral resources. Case studies.
 - d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticided problems, water logging, salinity, case studies.
 - e) Energy resources: Growing energy needs, renewable and non renewable energy resources, use of alternate energy sources. Case studies.
 - f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
Equitable use of resources for sustainable lifestyles.

Ecosystems

Concept of an ecosystem.

Structure and function of an ecosystem.

Producers, consumers and decomposers.

Energy flow in the ecosystem.

Ecological succession.

Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation Introduction-Definition: genetic, species and ecosystem diversity

Bio geographical classification of India

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values

Biodiversity at global, National and local levels India as a mega-diversity nation

Hot-spots of biodiversity

Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts.

Endangered and endemic species of India

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Environmental Pollution

Definition

Causes, effects and control measures of:

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution Pollution case studies Disaster management: floods, earthquake, cyclone and landslides.

Social Issues and the Environment

From Unsustainable to sustainable development

Urban problems related to energy

Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people, its problems and concerns, case studies.

Environmental ethics: Issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion nuclear accidents and holocaust, Case studies.

Wasteland reclamation

Consumerism and waste products.
Environment protection Act.
Air (Prevention and Control of Pollution) Act.
Water (Prevention and control of pollution) Act.
Wildlife protection Act.
Forest Conservation Act.
Issues involved in enforcement of environmental legislation.
Public awareness.

Human population and the Environment

Population growth, variation among nations.
Population explosion-Family Welfare Programme.
Environment and human health.
Human Rights
Value Education.
HIV/AIDS.
Women and Child Welfare.
Roll of Information Technology in Environment and human health.
Case Studies.

Field work

Visit to a local area to document environmental assets -river /forest/
grassland /hill/mountain.
Visit to a local polluted site –Urban /Rural/Industrial/Agricultural.
Study of common plants, insects, birds.
Study of simple ecosystems – pond, river, hill slopes, etc.

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidhi Publ. Ltd., Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
Email: mapin@icenet.net (R)
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clark R.S., Marine Pollution, Clarendon Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,
6. Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment (R)
9. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev.,
10. Environment & Security. Stockholm Env.Institute. Oxford Univ. Press. 473p.
11. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society,Bombay (R)
12. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ.Press 1140p.
13. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.

14. Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, web enhanced edition. 639p.
15. Mhaskar A.K., Matter Hazardous, Techno-Science Publications (TB).
16. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co., (TB)
17. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co., USA, 574p
18. Rao M N & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
19. Sharma B.K., 2001. Environmental Chemistry Goel Publ. House, Meerut.
20. Survey of the Environment, The Hindu (M).
21. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB).
22. Trivedi R.K., Hand of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II, Enviro. Media (R).
23. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB)
24. Wagner K.D., 1998. Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (M) Magazine (R) Reference (TB) Textbook

CHM 111/112 Engineering chemistry Lab [0 0 3 1]

1. Hardness of water.
2. Chloride content of water.
3. Copper in brass.
4. Iron in haematite.
5. Manganese dioxide in pyrolusite.
6. Chlorine in bleaching powder.
7. Calcium oxide in lime.
8. Ammonia Nitrogen in fertilizer.
9. pKa of weak acid.
10. Conductometric titration.

Reference book:

1. Vogel A - I, Text Book of Quantitative Inorganic Analysis, ELBS 5th Edition.

CSE 111/112 PROBLEM SOLVING USING COMPUTERS Lab [0 0 3 1]

1. Familiarisation with PC and MS-Window basic operations.
2. Flowcharting exercises.
3. Simple C++ Programs (expression oriented operations).
4. Experiments using Control Structures.
5. Experiments on Arrays (1 and 2D).
6. Experiments on Structures and use of Pointers.
7. TEST-1.
8. Experiments using built-in functions.
9. Experiments using user defined functions.
10. Experiments using class declarations and operations on objects.
11. Experiments using MS-Word and PowerPoint.
12. Experiments in the use of Excel.

13. TEST-2.

References:

- 1) E. Balagruswamy, Programming in ANSIC, 2nd edition TATA Mcgraw Hill
- 2) E. Balagruswamy, objet Oriented Programming with C++: 2nd edition TATA Mcgraw Hill

MAT 102 Engineering Mathematics – II [3 1 0 4]

Ordinary Differential Equations:

Definition of order, degree and solutions. Solutions of first order and first degree differential equations-variables separable, homogeneous and non-homogeneous equations, exact equations, linear equations & Bernoulli equation. (8)

General Linear Higher Order Differential Equations:

Linear homogeneous and non-homogeneous equations with constant coefficients, inverse differential operators and method of variation of parameters. Solution of Cauchy's homogeneous linear equations. Solution of simple simultaneous linear differential equations. (5)

Laplace Transforms:

Transforms of elementary functions, transformations of periodic functions, unit step function, shifting theorems, transforms of derivatives, inverse transforms, Solutions of differential equations using Laplace transforms.

Applications of equations on LRC circuits, string problems and forced vibrations. (10)

Linear Algebra:

Generalization of vector concept to higher dimensions, generalized vector operations, linear independence, basis, orthonormal basis. Vector spaces and sub-spaces. Simple examples.

Matrices, elementary column and row transformations,

Nverse of a matrix by elementary row operations, rank of a matrix, systems of linear equations, consistency, solutions by Gauss elimination. (8)

Differential Calculus:

Taylor's theorem for a function of two variables, extreme values of a function of two variables, Lagrange's

method of undetermined multipliers, simple problems. (6)

Multiple Integrals:

Definitions, evaluation by the change of order of integration, changing of variables, Jacobians Applications to areas and volumes. (8)

Beta and Gamma Functions:

Definitions, elementary properties, simple problems.

References:

1. E. D. Rainville and P. E. Bedient 1989 - A Short Course in Differential Equations, Macmillan Pub.
2. E. Kreyzig 2006 - Advanced Engineering, Wiley Eastern.
3. Shanti Narayan 2002 - Differential Calculus, Shyam Lal Charitable Trust. Delhi.
4. C. B. Thomas 1996 - Calculus and Analytical Geometry, Narosa Pub., Delhi.
5. N. Piskunov 1981 - Differential Calculus & Integral Calculus, Vol. I and II, Mir Pub.
6. G. Hadley, 2002 Linear Algebra, Narosa Publishers.

CIE -102 STRENGTH OF MATERIALS [3104]

1.Simple stress and strain: Mechanical properties of materials, normal stress and strain, Hooke's law, Modulus of elasticity, tension test on ductile and brittle materials, factor of safety, allowable stress, Poisson's ratio, shear stress and shear strain, modulus of rigidity, tapering bars and stepped bars, relation between modulus of elasticity, modulus of rigidity and bulk modulus. Statically indeterminate problems and thermal stress: Geometry of deformation, compound bars subjected to external loads and temperature changes. (14)

3.Shearing force and bending moment: Definitions, S.F. and B.M. diagrams for statically determinate beams subjected to different types of loads, relation between bending moment, shearing force and distributed load. (06)

4.Stress due to bending: simple bending theory, section modulus, moment of resistance (04)

5.Stress due to shearing force: Shear stress distribution in beams with different shapes of cross-section (04)

6.Slope and deflection of beams: relation between bending moment, shearing force, slope and deflection. Determination of slopes and deflections in statically determinate beams by direct integration method, Macaulay's technique. (05)

7.Torsion: Simple torsion theory, solid and hollow circular shafts, power transmitted by shafts. (04)

8.Variation of stress at a point: Bi-axial state of stress and strain, normal and shear stresses at a point on any given plane in a general two-dimensional stress field, principal plane and principal stresses, Mohr's circle of stress, combined bending and shear (05)

9.Cylinders: Analysis of thin and thick cylinders subjected to fluid pressure (04)

10.Stability of columns: Slenderness ratio, failure by buckling, Euler's formula, concept of equivalent length for different support conditions, limitation of Euler's formula, Empirical formula (04)

References

1. E.J. Hearn, Mechanics of materials, Vol. I., pergamon Press 1991.
2. E.P. popov Mechanics of materials, S.I. Version PHI 1993
3. Pytel and Singer strength of Materials, Herper & Collins 1987
4. Bhavikatti S.S. strength of Materials, Vikas Publishers, 2005
5. Basavarajaiah & mahadevappa, strength of Materials CBS publishers, 2001
6. Rajput R.K. strength of Materials S Chand & Co., 2004
7. Ramamrutham & Narayanan , strength of Materials Dhanpat Raii, 1989

ECE 101/102 BASIC ELECTRONICS [3 1 0 4]

Introduction to Semiconductor Theory:

Energy bands, conduction in solids, classification of materials based on energy band theory.

Semiconductor doping, effects of heat and light.

Drift and diffusion current. (5)

PN-Junction and its Applications:

The PN-junction characteristics, diode equation (no derivation) PN-junction as a rectifier. Half-wave, full wave and bridge rectifier circuits, derivation of expression for V_{dc} , I_{dc} and ripple factor.

Need for filters, operation of capacitor filter with expression for ripple factor. (9)

Zener Diode:

Zener and Avalanche break-down, characteristics, basic zener voltage regulator. (3)

Working of Bipolar Junction Transistor:

Input and output volt-ampere characteristics of BJT in CB and CE configurations, relationship between L & B .

Qualitative treatment of transistor as an amplifier.

Operating point selection, biasing of transistor.

The different methods of coupling, two-stage RC coupled amplifier, frequency response characteristics. (9)

Operational Amplifier:

Ideal characteristics, OP-AMP μA 741, its typical characteristics, Common mode gain, differential gain, CMRR. Application of OP-AMP as inverting amplifier, non-inverting amplifier, adder, integrator, differentiator, voltage follower and comparator. (6)

Introduction to Communication Systems:

Basic block diagram of communication systems, modulation, need for modulation. Amplitude modulation, expression for AM and its waveform.

Frequency modulation, expression for FM and its waveform, comparison between AM and FM. (6)

Digital Electronics:

Number systems, binary, octal, BCD and hexadecimal representation, number base conversion. Addition and subtraction using 2's complement method.

Binary logic, Boolean algebra, DeMorgan's laws, Venn diagram. Basic gates and universal gate implementation (using discrete components).

Half adder and Full adder. Memory element (S-R flip-flop and D flip-flop), shift register and basic counter. Introduction to Microprocessor (block Schematic). (10)

References:

1. MILLMAN & HALKIAS 1971 "Integrated Electronics", TMH .
2. GEORGE KENNEDY 1966. "Electronic Communication Systems", TMH, Delhi.
3. M. MANO 1991 "Digital Design", PHI .
4. BOYLSTED & NASHELSKY, 1993 "Electronic Devices and Circuits Theory", 5th Edition, PHI Delhi.

MME 101/102 MECHANICAL ENGINEERING SCIENCE [3 1 0 4]

Properties of Steam: Steam formation, Types of steam, Steam properties- Enthalpy, Saturation Pressure and Temperature, Simple numericals for finding enthalpy and dryness fraction. [6]

Steam Boilers: Classification, Working principle of Lancashire boiler, Babcock & Wilcox Boiler. Boiler Mountings, Accessories their location and applications [3]

Steam Turbines: Classification, Working principle of simple Impulse and Reaction turbines. Advantages and application. [3]

Refrigeration: Refrigerants, Commonly used refrigerants and desirable properties. Definition of COP, Unit of Refrigeration, Principle and Working of Vapour compression refrigeration. [2]

I.C. Engines: Classification, Working of 2-stroke, 4-stroke C.I. and S.I. Engines P.V.diagrams of Otto and Diesel cycles. Working of Simple Carburetor, and Diesel Fuel Injection pump. Definition and simple problems of Indicated Power, Brake Power, Mechanical efficiency, Indicated thermal efficiency, and Brake thermal efficiency. [8]

Lubrications: Definition, Lubricant types and desirable properties, applications, Splash lubrication, Pressure lubrication used in IC engine. [2]

Power Transmission: Definition, Types of Pulleys, Belt drives, Velocity ratio, Derivation for length of belt and Tension in the belt, Slip, Creep. Chain drives. Gear Drives, Types of gears (application only, no sketches). Gear trains-simple and compound. Simple calculations for all drives. [8]

Machine Tools:

Lathe: Block diagram, functions of parts (no sketches). Single point cutting tool nomenclature. Types of operations: Straight turning, Step turning, Facing, Knurling, Chamfering, Thread cutting, Parting-off, Taper turning by Form tool, Tail stock set over, Swiveling compound rest and its calculations. [5]

Drilling: Classification of Drilling machines. Block diagrams of Sensitive and Radial drilling machines showing various parts and their functions. Drilling operations: Drilling, Reaming, Boring, Counter boring, Counter sinking, Spot facing, Trepanning & Tapping. [3]

Casting: Mould making, Preparation of moulding sand and its desirable properties, Types of Patterns and Allowances, Steps in the preparation of two box green sand mould. Defects in casting. [3]

Forging: Definition, hand tools and hand forging operations. [2]

Welding: Definition, Classification, Principle and working of Oxy-Acetylene gas welding. Principle of Electric arc welding. Principle of Resistance spot welding. Principle of Soldering and Brazing. [3]

References:

- 1.Gopalakrishna K.R. (1999) “Mechanical Engineering Science” Subhash publications, Bangalore
- 2.Roy & Choudhury (2000) “Elements of Mechanical Engineering” Media Promoters & Publishers Pvt. Ltd, Mumbai
3. Mishra B.K.(1999) “Mechanical Engineering Sciences” Kumar & Kumar Publishers(P) Ltd, Bangalore
4. Rajan T.S.(1998) “Basic Mechanical Engineering” New Age International(P)Ltd, New Delhi

MME 103/104, ENGINEERING GRAPHICS [2 0 6 4]

Principle of Orthographic Projections

1. Points, straight lines parallel to one ref. plane (HP/VP) and inclined to other ref. plane.
2. Straight lines inclined to both HP and VP.
3. Straight lines inclined to both HP & VP and parallel to PP.
4. Straight lines with traces.
5. Practical problems on straight lines.

Projections of Plane surfaces

6. Perpendicular one ref. plane (HP/VP) and inclined to other ref. plane.
7. Inclined to both HP & VP.
8. Inclined to both HP & VP and perpendicular to PP.

Projections of Solids (right regular) by change of position method

9. Axis parallel to one ref. plane(HP/VP) and inclined to other ref. plane.
10. Resting on one of the ref. plane, axis inclined to both HP & VP.
11. Suspended freely, axis inclined to both HP & VP.
12. Axis inclined to both HP & VP parallel to PP.

Projections of solids by Auxiliary plane method

13. Axis inclined to both HP and VP.
14. Typical problems using both the methods.

Sections of solids (right regular and no spheres)

15. Using Horizontal and vertical section planes.
16. Using section plane perpendicular to one ref. plane and inclined to the other ref. plane.
17. Given the regular true shapes of various solids and find the inclination of section plane.
18. Typical/practical problems.

Development of surfaces

19. Parallel line development
20. Radial line development
21. Triangulation development

Isometric projections

22. Plane surfaces and simple solids (prisms & cylinders)
23. Frustum and combination of solids.
24. Simple machine elements

Introduction to Computer Aided Drafting.

References:

1. Gopalkrishna K. R. (2001) "Engineering Graphics" Suhas Publications, Bangalore.
2. Venugopal K. (2001) "Engineering Drawing and Graphics + Autocad" Newage International Publishers, Delhi.
3. Narayana K. L. and Kannaiah P. (2002) "Text book on Engineering Drawing" Scitech Publications, Chennai.
4. Bhat N. D. (2000) "Engineering Drawing" Charotar Publishing House, Anand.

MME 106/105, BASIC WORKSHOP PRACTICE

[0 0 3 1]

1. Introduction to Basic Workshop Practice. [3]

2. Fitting practice: Practical exposure to basic fitting operations; Marking and measuring, Filing, Sawing & Chipping and preparation of joints. [15]
3. Carpentry practice: Practical exposure to basic carpentry operations; Marking and measuring, Planing, Mortising & tenoning, Sawing and Chipping and preparation of joints [12]
4. Soldering practice: Practical exposure to basic sheet metal & soldering operations; marking & measuring, Cutting, Bending/forming, tinning, soldering and preparation of sheet metal models. [3]
5. Demonstrations on Tapping & Dieing, Welding, Plumbing and Lathe operations. [3]

References:

1. Hajra Chaudhury S.K. and Bose S.K. (2003) “Workshop Technology Vol.1” Media Promoters and Publishers Pvt. Ltd., Mumbai.
2. Raghuvanshi B. S. (2003) “Workshop Technology Vol.1” Dhanpat Rai and Sons, Delhi.

PHY102/101 ENGINEERING PHYSICS (3 1 0 4)

Physics Optics

Interference –Thin film –Air wedge – Newton’s Rings- Michelson interferometer, Diffraction-Fresnel diffraction – Rectilinear propagation of light – zone plate. Fraunhofer diffraction – diffraction at single and multiple slits- Diffraction grating. Polarization ellipse, quarter and half wave plates, photo elasticity.

Modern Optics

Laser –Principle of lasing action –Ruby and He-Ne lasers.

Optical fibers – types and propagation of waves.

X-ray continuous and characteristic X-ray spectra-Moseley’s law.

X-ray diffraction –Bragg’s spectrometer.

Quantum mechanics

Dual nature of matter-Phase velocity and group velocity –de Broglie’s hypothesis-Heisenberg’S uncertainty Principle – time independent schrodinger wave equation applications of Schrodinger wave equation-case of free particle, case of a particle in a potential well of infinite depth, Particle in a finite potential well tunneling.

Semiconductors

General introduction to classification of solids based on band structure Types of semi conductors, effective mass, density of states, Femi factor and Fermi level. Carrier concentration, law of mass action in semiconductors –temperature effect :Hall effect, electrical conductivity – effect of temperature; drift and diffusion currents, Einsteins relation. Generation and recombination processes. P-n junction, contact potential, depletion width, junction capacitance, diode current equation.

Reference Books:

1. Fundamental of Optics – Jenkins F A and White H E; Mc Graw –Hill Int. Edn.
2. Physics – Holliday D., Resnick R. and Krane K S 5th Edn. Vol.2, John Wiley and Sons, Inc
3. Text Book of Optics – Brijlal and Subramanyam, Chand and Co. Pub.
4. Modern Physics –Serway R A, Moses C J and Moyer C A 2nd Edn. Harcourt, College Pub.
5. Concepts of Modern Physics – Arthur Beiser 5th Edn. Tata McGraw Hill Pub
6. Engineering Physics – Basavaraju, Subhas Stores, Bangalore.
7. Physics of Semiconductor Devices – S M Sze, John Wiley & Sons Pub.

PHY 112/111 Engineering. Physics Lab [0 0 3 1]

Experiments relevant to the theory and basic skills relevant to related engineering courses are included.

Biprism,

Air wedge,

Diffraction grating,

Ultrasonic interferometer,

Zener diode characteristics,

Geiger muller counter characteristics,

Band gap energy of semiconductors,

Rectifier,

Filter circuits,

Hall effect,

Series and parallel resonance circuit,

Planck's constant using photodiode,

Transistor characteristics.