B.E. 301 - ENGINEERING MATHEMATICS II

Unit I

Fourier Series: Introduction of Fourier series , Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier transform, Sine and Cosine transform.

Unit II

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations

Unit III

Second Order linear differential equation with variable coefficients : Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method

Unit IV

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange's Linear equation, charpit's method. Linear partial differential equation of second and higher order: Linear homogeneous and Non homogeneous partial diff. equation of nth order with constant coefficients. Separation of variable method for the solution of wave and heat equations

Unit V

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem

References

(i) Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
(ii) Higher Engineering Mathematics by BS Grewal, Khanna Publication
(iii) Advance Engineering Mathematics by D.G.Guffy
(iv) Mathematics for Engineers by S.Arumungam, SCITECH Publuication
(v) Engineering Mathematics by S S Sastri. P.H.I.

FT- 302 Town Planning and Safety in Construction Industry

Unit I:
Town Planning : Planning surveys, slection of site for urban development, consideration cliats,Topography, Drainage and water supply etc. Types of roads in urban areas communication system and it relationship to the cities. Multi story flats, Group Housing, Group Ware Housing, Commercial complexes, Detached and Semidetached houses in relation to fire risk. Types of housing units, Layout of Housing areas with consideration of site orientation, views and architectural aesthetics.

Unit II :
Basic Philosophy : Structural Soundness, Accident and Hazards – their causes & effect. Accident investigation and reporting. Monitoring of safety performance. Treatment of injuries and rehabilitation. Safety Budget, organization, training, implementation. Safety officers. Safety committee.

Unit III
Safety in Construction Operations
1. Underground works: - Excavation, drilling & blasting, trenching, strutting, piling & safety in using and operation machinery and equipment relating to above components.
2. Above ground works : Scaffolding, Centering, Frame work, Ladders, Concreting wall and floor openings, staircases and railings. Structural steel work including welding, cutting erection etc. Safety in use of related machinery equipments.
3. Underwater operations: River draining, well sinking, Caissons, under water concreting. Cofferdams & special operation connected with irrigation works. Use of related machinery and equipments.
4. Movement of Materials & personnel : Heavy / Long items, Railway wagons, Motor trucks, Vehicles and Hazardous materials etc.
5. High rise building, bridges, roads, railways, asphalting, pneumatic caissons, electrical installations & lifts.
6. Fire prevention and protection: Handling of explosives. Precautions.

Unit IV :
Safety in Demolition Operations: Planning & permit, Precautions prior to demolition. Protection of public. Precautions during demolition. Sequence of demolition operations from safety point. Safety measures with respect to building materials including coment, lime, timber, steel, glass, paints, varnishes, and petroleum products.

Unit V:
HEALTH AND WELFARE : Occupational hazards, Occupational Diseases. Personal protective equipments. Health. Welfare measures. First aid facilities. Occupational health centers. Ambulance rooms. Medical examination. Salient Features of safety and Health in The Building & other Construction Workers (Regulation of employment and conditions of service) Act 1996 and central rules 1998 IS & NB codes).

References :-
1. Accident prevention manual for Industrial operations, NSC, Chicago, 1982.
2. Fulman, J.B., Construction Safety, Security & Loss Prevention, John Wiley and Sons, 1979.
3. The Building and other construction workers (Regulation of Employment & conditions of service)Act 1996 and central rules 1998.

FT- 303 Strength of Materials

Unit 1

Simple Stress and Strains: Concept of Elastic body, stress and Strain, Hooke's law, various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses. Complex Stress and Strains: Two dimensional and three dimensional stress system, normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr's circle of stresses, Combined Bending and Torsion, Theories of failure.

Unit 2

Bending & Deflection: Theory of simple bending: Concept of pure bending and bending stress, Equation of bending. Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading. Bending & shear stress distribution across a section in Beams. Deflection of beams: Double Integration Method. Conjugate Beam Method, Macaulay's Method Area Moment Method.

Unit 3

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow shafts, Open and closed coil springs, Leaf Spring, Spiral Spring, Pressure Vessels: Thin and Thick walled cylinders and spheres. Stress due to internal pressure, Change in diameter and volume, Compound cylinders and shrink fittings.

Unit 4

Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Shear center; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.

Unit 5

Columns and Struts: Euler's buckling load for uniform section, various end conditions, slenderness Ratio, Stress in columns, Rankine formulae, Eccentric loading on columns.

References:

1. Nash; Strength of Materials (Schaum), TMH.
2. Rattan SS; strength of Materials; TMH
3. Negi; Strength of materials; TMH
4. Sadhu Singh; Strength of Materials, ,
5. Ramamrutham; Strength of Materials, ,
6. Subramaniam; Strength of Materials; R; Oxford
7. National Building Code of India, Part-IV

List of Experiments (Pl. expand it):

The experimental work to cover tension, compression, bending and impact test etc. on steel, cast iron, RCC and timber, Fire Resistant Test of Structures and Combustibility of Building Materials Test as per I.S.I. and other experiments based on the syllabus.

FT- 304 Heavy Vehicle Automobile Engg. & Safety

UNIT-I

ENGINES : Engine Classification, construction, details of Engine Components. Combustion in S.I. Engines, Combustion in C.I. Engines, Study of fuel system components. Function of carburettors, construction details, Type of Study of diesel fuel feed systems. Carburation and mass distribution of mixture, supercharging, fuel injection and injection sections. Clutch, Types, Construction, Operation and Fault finding of clutches. Transmission assembly, Types of Gear box, Transfer of gear box, operation and maintenance of gear box.

UNIT-II

Differential Necessity, Construction of differential systems. Axles, Types and Application. Brakes, Types, Construction and Operation of Hydraulic, Pneumatic Brake Systems, Maintenance of Brakes. Suspension, Necessity, Types, Construction and operation, Shock absorber, Coil springs, Independent suspension, Hotchkiss drive, Torque tube drive. Steering, Systems, Constructional details, types of steering gear box, steering geometry, caster, camber, king pin inclination, Effect of steering geometry on directional stability, Power steering Lubrication systems. Types, classification of systems. Lubricants. Cooling System – Air cooling, components, and working of cooling systems.

UNIT-III

Electrical System. Ignition Systems, Magnet ignition, Battery Ignition, Electronic Ignition, Merits and Demerits, Working, Self Starter, Dynamo voltage regulator, Battery construction, operation and maintenance. Pollution. Air-Pollution, Euro norms, Pollution Control techniques.

UNIT-IV

Lubricating System: Types, Components, Lubricating oil, Cooling System, Detail of Components, Study of Systems, Types, Miscellaneous, Spacial Gadgets and accessories for Fire Fighting vehicles, Automobile Accidents, CMV Rules regarding safety devices for Drivers, Passengers, Fire fighting vehicles & Appliances. Construction & operation of fire fighting vehicles & appliances Construction & Operation of Fire boats & other Water borne applications Rules & regulations of RTO. Laboratory testing of vehicles. Road testing of vehicles.

UNIT-V

Automobile safety devices

References:

1. Automobile chassis and body construction, Operation and Maintenance by Wills H. Crouse.
2. Automobile Machines – Principles and Operations by W.H. Crouse.
3. Modern Petrol Engine by Arther V. Judge
4. Ergonomies of Automation by A.T. Walford H.M.S.O.
5. Practical Automobile Engineering Illustrated by S.Adhey, Asia Publishing House, Bormh.
6. Automobile Engine overhaul by A.W. Judge and Sir Issac Pitman.
7. Automboile Electrical Maintenances by A.W. Judge and Sir Issac Pitman.
8. Fire Risks in Motor Vehicle Servicing by F.P.A. London.
9. Maintenance of Diesel Engine by H.M.S.O.
10. Automobile Engineering by G.B.S. Narrang.
11. Automobile Engineering by R.B. Gupta
12. A Course in Automobile"Engineering by R.P. Sharma
13. Heavy Vehicle Automobile Engg. & Safety

List of Experiments (Pl. expand it)

1. To study the differential Axel
2. Study of external combustion engines
3. Study of PTO
4. Design of fire fighting vehicles

FT- 305 Building Design & Drawing

Unit 1

Drawing of Building Elements – Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

Unit 2

Building Planning – Provisions of National Building Code, Building bye-laws, open area, set backs, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation.

Unit 3

Building Services – Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

Unit 4

Design and Drawing of Building – Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors, windows, ventilators and staircases etc.

Unit 5

Perspective Drawing – Elements of perspective drawing involving simple problems, one point and two point perspectives, energy efficient buildings.

References

1. Malik & Meo; Building Design and Drawing By
2. Shah, Kale & Patki; Building Design and Drawing; TMH
3. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling

List of Experiments (Pl. expand it)

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to all student)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).
6. Use of AutoCAD for preparation of drawings.

FT- 307 Fire Fighting & Field Training

UNIT I :
Hose Drills General movements to be noted for handling delivery hose, hydrant Drill (3-Men) Hydrant Drill (4-Men).

UNIT II :
Pump Drills Trailer Pump Drill (Four Men), Trailer Pump Drill (Six Men), Motor Fire Engine (without escape)/Water Tender Drill (Six Men), First Aid Hose reel Drill (Three Men).

UNIT III :
Ladder Drills : Extension Ladder (Four Men), Hook Ladder Drill, Hook Ladder Drill (One Men),Hook Ladder Drill (Two Men), Hook Ladder Drill (Three Men), Fire escape Ladder Drill (Six Men),getting a Branch to work up on Escape Ladder, getting a Branch to work from an escape Ladder, Turn Table, Ladder Drill (Six Men), Hydraulic Platform. Drill (Six Men).

UNIT IV :

Foam Drill (F.B.-2) Foam Drill with inline inductor (Six Men)

FT- 308 Fire Protection W/S

UNIT I: Definition of fire, elements of fire, Causes of fire.

UNIT II: Classification of fire; spreading of fire; Method of extinguishing fire; different extinguishing medias- water, foam, dry powder, ABC Powder, CO2, Halon.

UNIT III: Basic fire protection equipments, Fire Extinguishers (Hand Appliances) Water Type, Foam Type, Dry Chemical Powder Type, ABC powder Type, Co2 Type, Halon Type, & Modular Automatic Fire Extinguishers, Trolley Mounted fire extinguishers.

UNIT IV: Fire Protection systems, Fire Alarm System, Manual, Electric, & Automatic Fire Detection System, Public address system, Hose Reel System, Hydrant System, Co2 flooding system, Inert gas flooding system, FM-200 Gas flooding system. Sprinkler system (Manual & Automatic), Water spray system, water – mist system, Drencher System DCP fixed Installation, Foam fixed installation.

UNIT V: Mobile fire fighting Equipments Mobile Monitors, Trailor, Pumps, Fire Tenders;

Water Tender A & B	Water Cum foam Tender
DCP Tender	Co2 Fire Tender
Multipurpose Fire Tender	Fire Control Van
Salvage Tender	Rescue/Emergency Tender
Crash Fire Tender	Turnable Ladder
Hydraulic Platform	

BOOKS RECOMMENDED

1. HMSO Fire Manuals No.1 – No.12
2. Equipment IS Codes.
3. Fire Protection Manual By TAC
4. Fire Protection literature by Loss Prevention Association.