SYLLABUS PRESCRIBED FOR
FOUR YEAR DEGREE COURSE IN
BACHELOR OF ENGINEERING
MECHANICAL ENGINEERING

SEMESTER PATTERN
(CREDIT GRADE SYSTEM)
SEMESTER: THIRD

3ME01 MATHMATICS-III

Section-A

UNIT-I: Ordinary differential equations: - Complete solution, Operator D, Rules for finding complementary function, the inverse operator, Rules for finding the particular integral, Method of variations of parameters, Cauchy’s and Legendre’s linear differential equations. (10 Hrs)

UNIT-II: Laplace transforms: Definition, standard forms, properties of Laplace transform, inverse Laplace transform, initial and final value theorem, convolution theorem, Laplace transform of impulse function, Unit step function, Laplace transforms of periodic function. Solution of Linear differential equations. (10 Hrs)

UNIT-III
a) Partial differential equation of first order of following form- (i) \( f(p,q)=0 \); (ii) \( f(p,q,z)=0 \); (iii) \( f(x,p)=g(y,q) \); (iv) \( Pp+Qq=R \) (Lagranges form); (v) \( z=px+qy+f(p,q) \) (Clairaut form)
b) Statistics: Curve fitting by method of least squares (Straight and parabola only), Correlation, Regression.
c) Probability Distribution: – Binomial distribution, Poisson and normal Distribution. (10 Hrs)

Section-B

UNIT-IV: Complex Analysis: Functions of complex variables, Analytic function, Cauchy-Reimann conditions, Harmonic function, Harmonic conjugate functions, Milne’s method, conformal mappings (translation, rotation, magnification, inversion, bilinear transformation), singular points, expansion of function in Tayler’s and Laurent’s series. Cauchy’s integral theorem and formula, Residue theorem. (12 Hrs)


UNIT-VI: Vector Calculus: Scalar and vector point functions, Differentiation of vectors, Gradient of a scalar point function, Directional derivatives, Divergence and curl of a vector point function and their physical meaning, line, surface, volume integrals, irrotational and solenoidal vector fields, Stoke’s and Divergence theorem (without proof). (10 Hrs)

Books Recommended:-

Text Books:

Reference Book:
SECTION – B

Unit-IV Thin and thick cylinders and thin spherical shells subjected to internal pressures.

Unit –V
1. Strain energy under uniaxial tension and compression impact loads and instantaneous stresses.
2. Principal Stresses : Biaxial stress system, principal stresses, principal planes, Mohr’s circle of stresses.

Unit-VI
Deflection of beams
Deflection in statically determinate (simply supported) beams subjected to point loads, uniformly distributed loads, moments by Macauley’s method.

Books Recommended:

Text Books :

Reference Books :

3ME03 FLUID POWER-I

Section - A

UNIT-I: - 1) Introduction to the study of fluid motion. Mechanical properties of fluids and their influence on flow characteristics.
2) Fluid Statics:- Fluid pressure, pressure variation in fluids, manometers, forces on plane and curved surface buoyancy. (12 Hrs)

UNIT-II: Buoyancy, stability of floating bodies. Kinematics and dynamics of fluid flow:- Types of flows, Stream lines, potential lines, flow net, continuity equation. One and two dimensional motion, one dimensional method of flow analysis. Bernoulli’s equation. Venturiometer, Momentum equation for steady flow. Vortex motion. (8 Hrs)

UNIT-III:- Dimensional analysis: Dimensional homogeneity and dimension less ratios. Dimensionless parameters. Similitude and model studies. (6 Hrs)

Section - B

UNIT-IV:- Motion of viscous fluids:- Introduction to laminar and Turbulent flows. Boundary layer concept. Separation. Drag lift on immersed bodies. Reynolds number and its significance. (7 Hrs)

UNITV:- Darcy weisbach equation i.e. Equation of pipe flow, friction charts and its use, Minor losses in pipes and fittings, losses due to sudden enlargement and contraction, Hydraulic and energy gradient lines, pipes in series and parallel. Elementary concept of water hammer. (8 Hrs)

2. General Theory of Hydrodynamic Machines:- Eulers equation, Degree of reaction, classification of machines according to degree of reaction. Efficiencies: Volumetric efficiency, Hydraulic efficiency, mechanical efficiency and overall efficiency. (7 Hrs)

Books Recommended :-

Text Books:-
1. CSP Ojha, R. Berndtsson, Fluid Mechanics and Machinery; Oxford university.

Reference Books:-
1. R.K.Rajput; Engineering Fluid Mechanics; S. Chand publications.
2. Dr. Mody & Seth; Hydraulics and Fluid Mechanics; Standard book house

3ME04 ENGINEERING THERMODYNAMICS

Section-A

Unit-I Introduction to basic concepts of thermodynamics,
Macroscopic and microscopic approaches, properties of system, state and equilibrium, processes and cycle. Temperatures and Zeroth law of thermodynamics, Quasi-static process, Forms of energy and its conversion. Gas Laws and Ideal gas equation of states, difference between gases and vapours, equation of state, gas constant and universal gas constant.

Unit-II
Work and Heat: Definition of work, thermodynamic work, displacement work and other forms of work. Definition of Heat, Work and heat transfer as path function, comparison of work and heat, work done during various processes, P-V diagrams.
First law of thermodynamics: Energy of a system, classification of energy, law of conservation of energy law applied to closed system under going a cycle, Joules experiment. Energy as a property of system, internal energy as a function of temperature, Enthalpy, specific heat at constant volume and constant pressure. Change in internal energy and Heat transfer during various non-flow processes.
(10 hrs)

Unit-III
First Law applied to flow processes: Steady state, steady flow process, mass balance and energy balance in steady flow process, steady flow energy equation and its application to nozzles and diffusers, turbine and compressor pumps, heat exchangers, Throttle valve etc. work done and Heat transfer during steady flow processes.
(9 hrs)

UNIT IV
(7 Hrs)

Entropy: Entropy - a property of system, entropy change for ideal gases, entropy change of a system during irreversible process, lost work. Principle of increase of entropy. Availability and irreversibility: Available energy referred to cycle, decrease in available energy with heat transfer through a finite temperature differences. The Helmhltz and Gibbs functions, Availability, Irreversibility and effectiveness.
(8 Hrs)

Unit VI
a) Air Standard Cycles: Otto, diesel, semidiesel, sterling and joule cycles etc., their efficiencies and mean effective pressure.
b) Vapour Cycles:- Rankine and Modified Rankine Cycle. Comparison of Rankine and Carnot cycle, representation on P-V, T-S and H-S diagram. (No numerical on this unit)
(8 Hrs)

Books Recommended

Text Books
2. Thermodynamics Volume: I & II; R. Yadav;

Reference Books
1. Basic Engineering Thermodynamics - by Reyner Joel
2. Thermodynamics - by C.P. Arora.
4. Engineering Thermodynamics; P. Chattopadhyay; Oxford
5. Engineering Thermodynamics; Gordon Rogers, Yon Mayhew; Pearson

3ME05 MANUFACTURING PROCESSES-I
Section - A

Unit-I:- Introduction to manufacturing processes & classification; Introduction to pattern making- Pattern materials, pattern making tools, allowances, Types of patterns, functions of patterns, General properties of moulding sands, Mold hardness. Preparation of sand moulds of different types, Moulding processes, core making, core prints, core boxes. Sand casting Processes - Basic principle and Terminology of sand casting, gating system, types of gate, risers, etc.
(9 Hrs)

Unit-II:- Technology of melting and casting - Melting furnaces, crucibles, pit, open hearth, gas fired cupola, cupola operation and electric hearth furnaces, Electric furnaces - Direct Arc, Indirect arc and electric induction furnace. Defects in castings and its types, Causes and remedies of casting defects. Origin and classification of defects, shaping faults, Inclusion and sand defects, Gas defects, shrinkage defects, contraction defects, dimensional errors. Inspection and testing of castings:- Radiography, ultrasonic, Eddy current testing, fluorescent penetrant test.
(7 Hrs)

Unit III:- Casting processes and their principle of operation and applications permanent mold casting, slush casting, shell
molding, Investment or lost wax casting, vacuum process, centrifugal casting, continuous casting, Die casting equipment and processes for Gravity, pressure and vacuum casting methods, cleaning of castings, Modernisation & Mechanisation of Foundries. (8 Hrs)

**Section - B**

**Unit IV:**
Mechanical working of metals: Principle of hot and cold working process and its types, Extrusion, piercing, pipe and tube production, manufacture of seamless pipe and tubing. Shearing operations, tube drawing, wire drawing, spinning, embossing and coining, squeezing and bending operations, rotary swaging, Rolling, types of rolling mills, forging operations, upset forging. (8 Hrs)

**Unit V:**
Joining processes:- Mechanical joining processes, Mechanical fastening, riveting, soldering, brazing Welding, Types of welding processes-Arc welding: principle and working, Gas welding- principle and working Types and purpose of Electrodes, Electrode coatings(flux), TIG & MIG processes – Working principles and its applications, shielding gases, MIG-Spray transfer and dip transfer processes. (6 Hrs.)

**Unit VI:**
Submerged arc welding & resistance welding :: Heat generation in resistance welding, operational characteristics of resistance welding processes such as spot welding, projection welding, butt welding. Principle of operation of friction welding, forge welding, plasma arc, thermit welding. Welding defects, Testing and Inspection of welds, Ultrasonic, Electroslag, Electron Beam, laser welding, weldability. Surface Treatment-Electroplating, electroforming, and iodising, metal spraying, shot peening, polishing, mechanical cleaning. (9 Hrs)

**Books Recommended**

**Text Books:**

**References:**
2. Manufacturing Processes by J.P. Kaushish; PHI

4. Foundry Technology by Goel Sinha.

**3ME06 / 3PE06 MECHANICS OF MATERIAL-LAB. / STRENGTH OF MATERIALS-LAB.**

**Practicals:**
Minimum Six to Eight out of following:
1. Tension test on metals.
2. Compression test on materials.
3. Shear test on metals.
4. Impact test on metals.
5. Hardness test on metals.
6. Torsion test on metals.
7. Deflection of beams.

Practical examination shall be viva-voce based on above practical and the syllabus of the course.

**3ME07 FLUID POWER-I-LAB.**

**Practical Term Work:**
At least six practical’s (study/Trials) based on above syllabus, as given below shall be performed and a report there of submitted by the students.
1. Study of Manometers.
3. Determination of metacentric height.
4. Verification of Bernoulli’s equation.
5. Flow measurement by venturimeter.
7. Determination of Reynolds number.
8. Velocity distribution in Boundary layer & thickness of B.L.
10. Determination of head loss due to sudden enlargement.
11. Determination of head loss due to sudden contraction.
12. Determination of losses in bends.
15. Verification of momentum equation.

**Note:** Practical examination shall consist of oral or Experimentation based on above term work.
3ME08 MANUFACTURING PROCESSES-I–LAB.

Practice:-
1. Study of safety precautions in workshop practices.
2. Foundry:- Any two of the following jobs Sand preparation and practice in moulding of various types of patterns:- Pattern making 1 job, Moulding 1 job Casting 1 job.
3. Joining Processes:- 2 composite jobs involving electric welding, gas welding and resistance welding process.

A journal should be prepared and submitted on above term work.

The practical examination shall consist of a job preparation and college assessment should be based upon the jobs, termwork and viva examination.

SEMESTER: FOURTH

4ME01/4PE01 BASIC ELECTRICAL DRIVES & CONTROL

Section - A

Unit I: Concept of general electric drives, classification and comparison of electrical drive system, Cooling and heating of electric motors. Introduction to mechatronics, Theory and principle of Power Transistor, SCR

Unit II: Basic characteristics of D.C. motor, Torque equation, Modified speed – Torque characteristics. Starting and braking of Electrical D.C. motors, comparison of mechanical and electrical braking methods. Introduction, Principle, construction and working of Servo motors, stepper motors, Brushless D.C. motors.


Section - B


Unit V: Basic principle, construction & applications of sensors and transducers, contact - non- contact type, optical proximity sensors. Switches, contact type, magnet type, electromagnetic type, sound, light, pressure, vibration transducers, Hall effect-sensors A.C./D.C. Tachogenerators.

Unit VI: Industrial applications - classes of duty selection of an electric drive for particular applications such as steel mill, paper mill, cement mill, textile mill, sugar mill, electric traction, coal mining, etc. Induction heating, surface hardening & Dielectric heating.

Books Recommended
Text Books:-
2. Basic Electrical Technology (Vol. 11) - B.L. Theraja

Reference Books :
1. Drives and Control - N. Dutta

4ME02 ENGINEERING METALLURGY

Section - A

Unit I: Introduction to metallurgy: Basic concept of process metallurgy, physical metallurgy, and mechanical metallurgy, Classification of materials & their application, Structure of metals and alloys, formation of Alloys, Solid solutions, types and their formation, lever rule for phase mixtures. Solidification of pure metals, nucleation and growth, ingot structure, dendritic solidification


Section - B

Unit IV: Cast irons : Factors governing condition of carbon in cast iron, Maurer’s diagram, Solidification of grey and white cast iron, Malleabalizing, Constitution and properties of white, gray, Nodular and Malleable cast irons, their applications, Alloy cast irons.

Non Ferrous Metals and Alloys : Types, Properties and uses of Brasses and Bronzes. Important alloys of
Aluminium, Lead, Tin and Zinc, their applications. Bearing materials, Season cracking, precipitation hardening. (8)

Unit V: Principles of Heat Treatment: - Annealing, Normalizing, Tempering Iso-thermal transformation diagrams(S-curve), super imposition of continuous cooling curves on ‘s’ Curve, pearlite, bainite and martensite transformation, Quenching media, severity of quench, Austempering, Martempering and patenting, Retained austenite and sub-zero treatment. Hardenability. (8)


Book Recommended:-

Text Books:-
1. Introduction to physical metallurgy ;Sidney H Avner, TATA Mc-Grawhill
2. Engineering materials & metallurgy R.K.Rajput, S chand publication

Reference Books:
4. Material Science and Metallurgy; V.D. Kodgire; Everest Publishing House
5. Engineering physical Metallurgy, Y Lakhtin, Mir Publications. Second Ed. 1999
6. Material Science and Meallurgy- C Daniel Yesudian, Scitech Publication
numeral on concept of super saturated flow & wilson line
Steam Turbines:- Principle of working, Types of steam turbines such as impulse, reaction, axial & radial flow, back pressure & condensing turbines. Compounding. Reheat, regenerative cycles, bleeding. Analysis limited to two stages only. (7 Hrs)

UNIT VI

Recommended Books:

Text books
1. Thermal engineering; Mahesh M Rathore; Tata McGraw-Hill
2. Thermal Engineering; R. Yadav; Central publication

Reference books:
1. Steam Turbine; Kearton; Oscar Publications
2. Thermal Power Engineering; Mathur Mehta; Tata McGraw-Hill
3. Power Plant Engineering; R.K. Rajput; Laxmi Publications
4. Thermal Engineering, P.L. Ballaney; Laxmi Publications

4ME04 MANUFACTURING PROCESSES-II

Section - A

UNIT I:- Theory of Metal cutting: Mechanics of Metal cutting, Tool material, Tool Geometry, Cutting tool classification, Tool life, Tool wear, Cutting forces and power consumption, Machinability, Cutting fluids, Machine Tool classification. (8 Hrs)

UNIT II:- Construction, Operations and accessories of centre lathe, introduction of capstan & turret lathe, indexing mechanism, bar feeding mechanism, introduction to Automatic screwmachines & Single spindle and multi-spindle automat. (10 Hrs)

UNIT III:- a) Drilling M/cs general purpose, Mass production and special purpose drilling M/cs.
   b) Boring M/c :- Horizontal, Vertical and jig Boring M/c.
   c) Introduction to Broaching and its types, reaming operation. (8 Hrs)

4ME05 MACHINE DESIGN & DRAWING-I

Section - A

UNIT I- a) Sectional Views
Conversion of pictorial view in to sectional orthographic projections, Sectional views with different types of projections, Missing views (12 Hrs)

UNIT II- a) Development of surfaces
Development of surfaces of cubes, prisms, cylinders, pyramids, cones & their cut sections

b) Intersection of solids-prism and prism, cylinder and cylinder, cylinder and prism, cone and cylinder, cone and prism.  

(12 Hrs)

Section B

Unit III- a) Meaning of Design, Phases of Design, Design considerations  
b) Simple stresses, Thermal stresses, Torsional Stress, stresses in straight & curved beams and its application- hooks, c-clamps  
d) Welded joints- Symbolic representation, Strength of transverse & parallel fillet welded section  
e) Design & drawing of Knuckle Joints  

(12 hrs)

Unit IV-a) Design of Helical springs- Types of springs, stresses in helical springs, Wahl’s stress factor, Buckling & surge, tension spring  
b) Spiral & leaf springs  
c) Design of power screw - Torque required to raise loads, efficiency & helix angle, overhauling & self locking of screw, acme threads, stresses in power screw.  

(12 hrs)

Books Recommended

Text Books :  
1) Machine Drawing by N. D. Bhatt, Charator Publication  

Reference Books :  
1) Machine Design by Dr. P. C. Sharma & Dr. D. K. Agrawal, Katsons Books publication  
2) Design of Machine elements by C. S. Sharma, Kamlesh Purohit, PHI publication  
3) Design of Machine elements by V. B. Bhandari, Tata McGraw Hill Publication  
4) Machine Design, Jindal, Pearson publications  
5) Design Data Book by- P.S.G. Koimbatore  
6) Design Data Book by Mahadevan, (Use of any data book from the above will be permitted during the examination).

4ME06 / 4PE06 BASIC ELECTRICAL DRIVES & CONTROL-LAB.  
List of Experiments  
Any eight practicals from the following list:

1. To study the Specification of Various Electrical Machines.  
2. To study the D.C. Motor Starters.  
3. To study the Running and Reversing of D.C. Motor.  
4. Speed Measurements using Magnetic Pick-up.  
5. To study the Speed reversal of counter Current Breaking of 3-phase Induction Motor.  
6. To control the speed of D.C. Motor by a) Armature Control b) Field Control.  
7. To perform Load Test on Induction Motor.  
8. To study Dynamic/Rheostatic Breaking of D.C. Motor.  
9. To study Characteristics of Thyristor.  
10. To study the speed -Torque Characteristic of Servo Motor.  

4ME07 ENGINEERING METALLURGY-LAB.  
List of Practicals: - (At least eight practicals out of the following list.)  
1. Study of metallurgical microscope.  
2. Preparation of specimen for micro-examination.  
4. Study of micro structures of Annealed and normalized plain carbon steels.  
5. Study of micro structures of alloy steels and H.S.S.  
6. Study of micro structures of various cast irons.  
7. Study of micro structures of non ferrous metals,(brasses, bronzes)  
8. Study of micro structures of hardened and tempered steels.  
10. Study different Heat Treatment Process for steel.  
11. Study of different surface Hardening processes for steels.  
12. Study of effect of alloying elements on the properties of steels.  
14. Study of hardness tester and conversion of Hardness number.  
15. Industrial visit to study heat treatment plant.  
16. Measurement of particle size, grain size, nodularity, coating thickness etc. by using some software like Metzer Microcam 4.0

Practical Examination:  
Practical examination shall consist of viva voce/performance based on the above syllabus and practical work.

4ME08 ENERGY CONVERSION-I-LAB.  
Practical Term Work:-  
At least six practicals (Study/trials) based on above syllabus, as given below shall be included in the report by the students.
1. Study of a water tube boiler (Babcock Wilcox boiler)
2. Study of a locomotive boiler.
3. Study of a high pressure boiler.
4. Study of boiler accessories.
5. Trial on a boiler and heat balance sheet.
7. Study and trial on a steam turbine.
8. Study of condensers.
9. Study of condensate and air extraction pumps.
10. Study of steam power plant.

Practical Examination:- Shall consist of based on above term work and syllabus.

4ME09 MANUFACTURING PROCESSES–II-LAB.
Practicals:-
1. Demonstration of operations related to lathe, shaper, slotter, drilling & grinding m/cs.
2. One job on lathe covering taper turning and threading.
3. One job on shaping covering plane and inclined surfaces.
4. One job on milling machine.
The above jobs should include drilling, grinding, tapping etc.
Term work should be submitted in the form of journal.
N.B.:- The practical examination shall consists of preparation of practical jobs and assessment by external and internal examiner.

4ME10 MACHINE DESIGN & DRAWING-I-LAB.
List of Practical’s
Any Six of the following
1) Sectional views & missing views of objects
2) Development of surfaces
3) Intersection of Solids
4) Conventions for various components like bearing, gears, springs, key & key ways, threads, tap holes and materials, Surface roughness etc
5) Design & Drawing of cotter joint
6) Design & drawing of screw jack
7) Design & drawing of flywheel
8) Design & drawing of helical spring
Any one practical from the above list should be done using software.

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Content of the Compulsory Subject
“Environmental Studies” are given on Page Nos. ES-1 to ES-4 i.e. at the end of this syllabus.
1. The Multidisciplinary nature of environmental studies
   - Definition, scope and importance.
   - Need for public awareness.
   (2 lecture hours)

2. 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.
   - 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.
   (7 lecture hours)

3. 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.
   - Role of Information Technology in Environment and human health.
   - Case Studies.
   (6 lecture hours)

4. Natural resources:
   - Renewable and non-renewable resources:
     - Natural resources and associated problems.
     - Forest resources: Use and over exploitation, deforestation, case studies.
     - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
     - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
     - Food resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizer - pesticide problems, water logging, salinity, case studies.
     - Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
     - 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.
   (8 lecture hours)

5. 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 :-
     - Forest ecosystem
     - Grassland ecosystem
     - Desert ecosystem
     - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
   (6 lecture hours)

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

7. Environmental Pollution
- Definition  
  - Causes, effects and control measures of:-  
    - Air pollution  
    - Water pollution  
    - Soil pollution  
    - Marine pollution  
    - Noise pollution  
    - Thermal pollution  
    - Nuclear hazards  
Solid Waste Management: Causes, effects and control measures of 
Role of an individual in prevention of pollution.  
Pollution case studies.  
Diaster management: floods, earthquake, cyclone and landslides. 

(8 lecture hours)

PART-C

ESSAY ON FIELD WORK 25 Marks 

8. Field work
- Visit to a local area to document environmental assets - river / forest / grass land / 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. 

(5 lecture hours)

(Notes: 
  i) Contents of the syllabys mentioned under paras 1 to 8 shall be for teaching for the examination based on Annual Pattern.  
  ii) Contents of the syllabys mentioned under paras 1 to 4 shall be for teaching to the Semester commencing first, and  
  iii) Contents of the syllabys mentioned under paras 5 to 8 shall be for teaching to the Semester commencing later.

LIST OF REFERENCES:-
2) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad - 380 013, India, Email: mapin@icenet.net( R) 
4) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB) 
6) De A.K., Environmental Chemistry, Wiley Eastern Ltd. 
7) Down to Earth, Centre for Science and Environment (R) 
9) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Mumbai (R) 
14) Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB) 
18) Survey of the Environment, The Hindu (M) 
23) जै. विद्युत धारणे : पर्यावरणशास्त्र- विद्युतधारणे अंत्य कंपनी पद्धतियों, नागपुर. (R) 
24) Dr. Deshpande, A.P.Dr. Chudiwale, A.D., Dr. Joshi, P.P., Dr. Lad, A.B.: Environmental Studies, Pimpalapure & Co., Publishers, Nagpur. (R) 
25) R.Rajagopalan : Environmental Studies, Oxford University Press, New Delhi, 2005 (R) 

(M) Magazine  
(R) Reference  
(TB) Textbook  
*****
Section B are a group of football supporters who follow Airdrieonians F.C., and before the current club's formation in 2002, followed the original Airdrieonians. The group, formed in 1977, have been well known throughout Scottish football for their boisterous, vociferous and often violent behaviour for over 40 years. The group is widely regarded as one of the most violent gangs in Scotland.

Locking Devices. Section B.

TWIST-LOCK, ®. Patented locking lugs interlock the two sections together when the device is assembled providing a secure assembly in abusive environment. Nylon webs join two sections together which makes assembly of the device quick and easy. The insulation displacement terminal reduces the time required for wire preparation and provides uniformity in the quality of termination.

Drawings to Accompany the Building Guidelines. Section B: Concrete Construction. Introduction | Section A | Section B | Section C | Section D | Section E | Section F | Section G Download AutoCAD DWG files (zip archive): Section A | Section B | Section C | Sections D-G.

Figure B-1: Permissible Arrangement of Strip Footings. All exterior walls and interior load-bearing walls should be supported on reinforced concrete strip footings.

Section B are a group of football supporters who follow Airdrieonians F.C., and before the current club's formation in 2002, followed the original Airdrieonians F.C.. The group, formed in 1977, have been well known throughout Scottish football for their boisterous, vociferous and often violent behaviour for over 40 years. The group is widely regarded as one of the most violent gangs in Scotland.[1]. For faster navigation, this Iframe is preloading the Wikiwand page for Section B. Home. News.