## COURSE STRUCTURE
### SECOND YEAR B.TECH PROGRAMME
#### CIVIL ENGINEERING

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<tr>
<th>3rd Semester</th>
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<tr>
<td><strong>Theory</strong></td>
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<tr>
<td><strong>Contact Hrs. Credit</strong></td>
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<td><strong>L-T-P</strong></td>
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<tr>
<td>BSCM 2201 Mathematics - III 3-1-0 4</td>
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</tr>
<tr>
<td>BENG 1208 Fluid Mechanics &amp; Hydraulic Machines 3-1-0 4</td>
<td>CPPME 6202 Mechanics of Materials-I 3-1-0 4</td>
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<tr>
<td>BSCP 2201 Physics - II / BSCP 2202 Physics of Semi-Conductor Devices 3-0-0 3</td>
<td>BSCP 2201 Chemistry - II / BSCP 2202 Physics of Semi-Conductor Devices 3-0-0 3</td>
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<tr>
<td>BSCC 2201 Chemistry - II / BSCC 2202 Material Sciences BCSE 3201 Object Oriented Programming UsingC++ 3-0-0 3</td>
<td>BCSE 3202 Relational Database Management System 3-0-0 3</td>
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<tr>
<td>HSSM 4201 Engineering Economics 3-0-0 3 &amp; Costing or HSSM 4202 Organisational Behaviour or</td>
<td>HSSM 4201 Engineering Economics &amp; Costing or</td>
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<tr>
<td>HSSM 4202 Organisational Behaviour PCAR 8205 Structural Analysis - I 3-1-0 4</td>
<td>PCCI 8201 Surveying - I 3-1-0 4</td>
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<td><strong>Total</strong> 21</td>
<td><strong>Total</strong> 21</td>
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| **Practicals/Sessionals**                | **Practicals/Sessionals**                |
| **Contact Hrs. Credit**                 | **Contact Hrs. Credit**                 |
| BENG 9202 Basic Electronics 0-0-3 2     | BENG 9201 Basic Electrical Engineering Laboratory 0-0-3 2 |
| or BENG 9201 Basic Electrical Engineering Laboratory or | BENG 9202 Basic Electronics Laboratory |
| BCSE 9201 Computer Lab (OOP) 0-0-3 2     | BCSE 9202 Computer Lab (RDBMS) 0-0-3 2   |
| BENG 9203 Mechanical Engineering Laboratory 0-0-3 2 | CPCE 9201 Building Drawing 0-0-3 2   |
| or CPCE 9201 Building Drawing 0-0-3 2   | or BENG 9203 Mechanical Engineering Laboratory |
| CPCE 9202 Civil Engineering Lab – I 0-0-3 2 | CPCE 9204 Surveying Lab. 0-0-3 2 |
| **Total** 8                              | **Total** 8                              |

L-Lecture  
T-Tutorial  
P-Practical
Module - I (9 Lectures)
Partial differential equations : The vibrating string. The wave equation & its solution.
The Heat equation and its solution

Module - II (10 Lectures)
Two - dimensional wave equation and its solution.
Laplace equation in polar, cylindrical and spherical coordinates. Potential.

Module - III (13 Lectures)
Complex analysis : Complex numbers and functions conformal mappings
Complex integration. Cauchy’s Theorem Cauchy’s integral formulas.

Module - IV (8 Lectures)
Taylor’s and Laurent’s series, Residue theorem, evaluation of real integrals.

The Course covered by : Advance Mathematics by E. Kreyszig, John Wiley & Son’s (P) Ltd. (8th Edition)
Chapter 11 (except 11.6)
Chapter 12, 13, 14, 15

BENG 1208 - FLUID MECHANICS AND HYDRAULIC MACHINE (3-1-0)

Module – I
(12 hours)
Introduction : Scope of fluid mechanics and its development as a science
Physical property of Fluid
Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity, compressibility and bulk modulus, Fluid classification.

Fluid static
Pressure, Pascal’s Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute pressure, gauge pressure and vacuum pressure, monometer.
Hydrostatic process on submerged surface, force on a horizontal submerged plane surface, force on a vertical submerged plane surface.

Module – II
(12 hours)
Buoyancy and flotation, Archimedes’ principle, stability of immersed and floating bodies, determination of metacentric height.
Fluid dynamics : Introduction, Euler’s equation along a streamline, energy equation, Bernoulli’s equation, Analysis of finite control volumes and its application to siphon, venturi meter, orifice meter

Module – III
Turbine : Classification, reaction, Impulse, outward flow, inward flow and mixed flow turbines, Francis & Kaplan turbines, Pelton wheel, Physical description and principle of operation, Governing of Turbine.

Module – IV
(8 hours)
Centrifugal Pump : Principles of classification, Blade angles, Velocity triangle, efficiency, specific speed, characteristics curve.
Reciprocating Pump : Principles of working, slip, work done, effect of acceleration and frictional resistance, separation
BSCP 2201 PHYSICS - II (3-0-0)

This one semester Physics course is divided into four units. The unit - I deals with some aspects of nuclear physics, unit - II introduces certain features of condensed matter physics, unit - III deals with certain aspects of semiconductors and superconductors and unit - IV introduces Opto-electronic devices and fibre-optic communication system.

Unit - 1

This unit covers the basic principles and applications of different types of accelerators and their important applications.

Detailed constructional features of accelerators are not necessary.

1. Need for nuclear accelerators.
3. RF accelerators: Linear accelerator, cyclotron, electron accelerator, betatron.

Unit - 2

This Unit deals with diffraction in crystals and its role in determining crystal structure.
Study of crystal structure by diffraction methods, Bragg’s condition for crystal diffraction, Lau condition, Miller indices, Reciprocal lattice, Geometrical structure factor, Atomic form factor.

Unit - 3

This unit deals with certain features of semiconductors and superconductors.

2. Superconductivity: Superconductors and their properties, Meisner effect, Type - I and Type - II Superconductors, Thermodynamic properties of superconductors, London equation, Application of superconductors.

Unit - 4

This unit introduces some Opto - electronic devices and fibre - optic communication system.
LED: Principle construction of operation and application, Introduction to fibre optics, basic characteristics of optical fibres, optical fibre communication system.

Books Recommended:

1. Nuclear Physics, P. R. Roy & B. P. Nigan
2. Particle Accelerators, M. S. Livingston & J. P. Blewett
3. Concepts of Modern Physics, A. Beiser
4. Introduction to Solid State Physics, C. Kittel
5. Introduction to Lasers, A. Avadhnulu

**BSCP 2202 PHYSICS OF SEMICONDUCTOR DEVICES (3-0-0)**

**Module I**

(9 Hours)

An appreciation of Quantum Mechanics in determining electrical properties of semiconductor.

**The Semiconductor in Equilibrium**:
Level, variation of EF with doping concentration and temperature.

**Carrier Transport Phenomena**:
Carrier Diffusion: Diffusion current density. Total current density. The Einstein relation.

**Module II**

(9 Hours)

**Non-equilibrium Excess Carrier in Semiconductor**

**The Pn junction and Diode**
Pn junction Diode: Ideal – current voltage relationship, Minority Carrier distribution, Ideal Pn junction currents under forward and reverse bias.

**Module III**

(9 Hours)

Pn junction diode (contd.):
Temperature effects, Small signal model of Pn junction, Equivalent circuits Recombination Current. Junction Breakdown.

**Metal-Oxide- Semiconductor FET (MOSFET)**

operation, Current –Voltage relation (Concepts)

Frequency limitation : Small signal Equivalent circuit.

The CMOS Technology.

**Module IV**

(8 Hours)

**The Bipolar Transistor**


**Text Book :**

1. Semiconductor Physics and Devices- Basic Principles BY Donald A. Neamen, 3rd Edition, Tata McgrawHill Edition. (Selected portion from chapters 2,4,6,7,8,10 &11.)

**For additional reading**


**BSCC 2201 CHEMISTRY - II (3-0-0)**

(Total No. of Lectures = 40)

**Module I (10 Lectures)**

Water quality parameters and standards. Treatment of water for industrial and domestic purpose.

Module II (14 Lectures)
(To develop the basic concepts on corrosion and industrially important polymers.)

1. Corrosion:
   Dry and wet corrosion, Galvanic Corrosion, Stress Corrosion, Factors affecting corrosion, Corrosion Control: (Proper design and fabrication procedure, Cathodic protection, Passivation).
   (6 Lectures)

2. Polymers:
   Nomenclature and classification, Mechanism of polymerization (free radical and ionic) Thermoplastic and thermosetting resins, Some typical useful polymers: Polyethylene, PVC, polystyrene, PMMA, Nylon 6:6, Nylon 6, Bakelite, Terylene, Silicones, Natural and synthetic rubbers: Neoprene, Butyl and Polyurethane rubber, Vulcanization.
   (8 Lectures)

Module III (10 Lectures)
(To introduce the students about the basic concepts of fuels)

1. Fuels:
   Classification of fuels, calorific value, Analysis of Coal, Manufacturing process of metallurgical coke, Refining of Crude oil, Fractional distillation, Cracking, Knocking and antiknocking, Octane and Cetane number.
   Gaseous Fuel: Producer gas, Water gas, LPG & CNG.
   Combustion Calculation.

Module IV (6 Lectures)

1. Environment pollution:
   Green house effect, acid rain, depletion of ozone layer; Water pollution - bio chemical effect of lead, arsenic, mercury and fluorides, sewage-B.O.D. and C.O.D.

Books:
3. Environmental Pollution, A.K. Dey.

BSCC 2202 MATERIAL SCIENCES (3-0-0)

MODULE - I (10 Lectures)


MODULE - II (10 Lectures)
5. Dielectric Materials : Microscopic Displacement of atoms and molecules in an external dc electric field, Polarization and dielectric constant, Dielectric susceptibility. Temperature dependence, Dielectric Breakdown. Ferro electric material Piezoelectrics, Pyroelectrics, Dielectric Materials as electrical insulators.

MODULE - III (10 Lectures)
   Plastics - Types : Thermosetting and thermoplastics. Transfer moulding, injection moulding, extension moulding, Blow moulding, Welding of plastics; Rubber types, application.
9. Ceramics : Types, Structure, Mechanical properties, applications

MODULE - IV (10 Lectures)

Text Books :
2. Vijaya M. S., Rangarajan G, Materials Science, TMH
3. Rajendra V., Marikani A., Materials Science, TMH
4. Van Vlack L. H., Elements of Material Science and Engineering, Addison Wesley
5. Material Science, Raghavan
6. Processes and Material of Manufacture : Lindberg, PHI.

BCSE 3201 OBJECT ORIENTED PROGRAMMING USING C++ (3-0-0)
Module I
(10 Hours)
Introduction to object oriented programming, user defined types, polymorphism, and encapsulation. Getting started with C++ -syntax, data-type, variables, strings, functions, exceptions and statements,
namespaces and exceptions, operators. Flow control, functions, recursion. Arrays and pointers, structures.

Module II (10 Hours)
Abstraction mechanisms: Classes, private, public, constructors, member functions, static members, references etc. Class hierarchy, derived classes.
Inheritance: simple inheritance, polymorphism, object slicing, base initialization, virtual functions.

Module III (12 Hours)
Prototypes, linkages, operator overloading, ambiguity, friends, member operators, operator function, I/O operators etc.
Memory management: new, delete, object copying, copy constructors, assignment operator, this input/output.
Exception handling: Exceptions and derived classes, function exception declarations, Unexpected exceptions, Exceptions when handling exceptions, resource capture and release etc.

Module IV (8 Hours)
Templates and Standard Template library: template classes, declaration, template functions, namespaces, string, iterators, hashes, iostreams and other type.
Design using C++ design and development, design and programming, role of classes.

Text Books:
1. Bhave & Patekar- Object oriented Programming with C++, Pearson Education
3. Robert Lafore- Object oriented programming in Microsoft C++.
4. Balguru Swamy-C++, TMH publication

HSSM 4201 ENGINEERING ECONOMICS AND COSTING (3-0-0)

Module I (10 Hours)
Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

Module II (10 Hours)
Projects : Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.

Module III (10 Hours)
1. Horn green, C.T., Cost Accounting, Prentice Hall of India

HSSM 4202 ORGANIZATIONAL BEHAVIOUR (3-0-0)

Module I (8 Hours)
Learning – Nature of Learning, How Learning occurs, Learning and OB.
Case Analysis

Module II  (10 Hours)
Foundations of Individual Behaviour: Personality – Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.

Module III  (12 Hours)
An Introduction to Transactional Analysis (TA).

Module IV  (10 Hours)

Case Analysis

TEXTBOOKS:
Keith Davis, Organizational Behaviour, McGraw – Hill.

REFERENCE BOOKS:
Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.

PCAR 8205 STRUCTURAL ANALYSIS - I (3-1-0)

MODULE I  (10 Hours)
1. Introduction to statically determinate / indeterminate Structures with reference to 2D and 3D structures. Free body diagram of structures.
2. B.M. & S.F. diagrams for different loading on simply supported beam, cantilever, propped cantilever and overhanging beams. Three hinged arches, tangential shear and normal thrust.

MODULE II  (12 Hours)
3. Deflection: Strain energy method, castigliane’s theorems, reciprocal theorem, conjugate beam method, unit load method.
4. Deflection of joints / supports for both determinate and indeterminate trusses. Application of three moment theorem applied to continuous beams.

**MODULE III**

(12 Hours)

5. ILD for determinate structure for reactions at supports, S. F at a given section, B.M. at a given section, maximum shear and maximum B.M at a given section, problems relating to series of wheel loads, udl less than or greater and better than the span of the beam, Absolute maximum B.M.

6. ILD for B.M., S.F. normal thrust and radial shear of a three winged arch.

**MODULE IV**

(8 Hours)

7. Suspension cables, 3 hinged stiffring ginders

8. Introduction to space frames.

**TEXT BOOKS**

1. Structural Analysis - C. S. Reddy, TMH Publisher
2. Structural Analysis - Norvis & Wilber

**PRACTICALS**

**BENG 9202 BASIC ELECTRONICS LAB. (0-0-3)**

(At least 8 experiments including 1 - 7 and any one from 8 - 10)

1. Familiarity with electronics components and Devices
   Testing of a semiconductor Diode and a Transistor. IC pins connection (Digital Multimeter should be used should be used in testing components and devices).

2. Study and use of Oscilloscope to view waveforms and measure its amplitude and frequency.


4. Half wave and Full wave rectifiers without and with capacitor filter. Record of waveforms, Measurement of Average and rms values.

5. V - I Characteristics of anpn or pnp transistor. DC Biasing and measurement of dc voltages and currents.


7. Op amp in Inverting, non inverting, Integrating and Differentiating configuration, Record of wave forms.

8. Truth Tables of logic gates.

9. Study and experiment using MUX - DEMUX ICs / Shift Register IC.

10. Study on CMOS logic Inverter.

**BENG 9201 BASIC ELECTRICAL ENGINEERING LAB. (0-0-3)**

**List of Experiment (Any 8 of the following)**

1. Study and measurement the armature and field resistance of a DC machine.

2. Calibration of ammeter, voltmeter and wattmeter with the help of sub-standard instrument.

3. Verification of circuit theorems. Thevenin's and Superposition theorems (with DC source only).

4. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current, voltages and power in R-L-C series circuit excited by Single Phase AC supply.
6. Connection and starting of a three phase induction motor using direct online (DOL). or star-delta starter.
7. Connection and measurement of power consumption of a fluorescent lamp.
8. Determination of open circuit characteristics (OCC) of DC machine.
10. Connection and testing of a single phase energy meter (unity power factor load only)
11. Study of fan motor

**BCSE 9201 COMPUTER (OOP) WITH C++ LAB. (0-0-3)**

(10 classes for 10 different programs)

1. Programs on concept of classes and objects.(1 class)
2. Programs using inheritance.(1 class)
3. Programs using polymorphism.(1 class)
4. Programs on use of operator overloading.(1 class)
5. Programs on use of memory management.(1 class)
6. Programs on exception handling and use of templates.( 1 class)
7. Programs on File handling in C++.(1 class)

**BENG 9203 MECHANICAL ENGINEERING LAB. (0-0-3)**

**Group A (Mechanics / Material Testing Lab.**

1. Determination of equilibrium of coplanar forces.
2. Determination of Moment of Intertia of Flywheel

**Group B**

4. Determination of Metacentric Height and application to stability of floating bodies.
5. Verification of Bernoulli’s Theorem and its application to Venturimeter.

**Group C**

7. Calibration of Bourden Type Pressure gauj and measurement pressure using manometers.
8. Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine.

**CPCE 9201 BUILDING DRAWING (0-0-3)**

1. Plan, elevation, side view of residential/office building
2. Drawing of 2 bedroom/3 bedroom houses (single and two storied), ground and first floor plans, elevation and section for load bearing and framed structures.
3. Detailing of doors/windows
4. Drawing of several types of footing, bricks work, floor, staircases, masonry, arches and lintels.
5. Types of steel roof trusses
6. Detailing of floor and wall joints.
7. Project on establishment like Bank building/Post Office/Hostel/Library/Hospital/Auditorium/Factory building, etc.

**CPCE 9202 CIVIL ENGINEERING LAB. - 1 (0-0-3)**

<table>
<thead>
<tr>
<th>Material</th>
<th>Test/property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brick</td>
<td>(a) Shape and size test for brick</td>
</tr>
<tr>
<td></td>
<td>(b) Water absorption test of brick</td>
</tr>
<tr>
<td></td>
<td>(c) Compressive strength of brick</td>
</tr>
<tr>
<td>Cement</td>
<td>(a) Fineness of Cement</td>
</tr>
<tr>
<td></td>
<td>(b) Soundness of cement by Lechattelier test</td>
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<tr>
<td></td>
<td>(c) Specific gravity of cement</td>
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<tr>
<td></td>
<td>(d) Fineness of cement by air permeability</td>
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<tr>
<td></td>
<td>(e) Standard consistency of a given sample by Viccat test</td>
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<tr>
<td></td>
<td>(f) Initial and final setting time of cement</td>
</tr>
<tr>
<td></td>
<td>(g) Fineness modulus of fine and coarse aggregate</td>
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<tr>
<td></td>
<td>(h) Aggregate crushing value of coarse aggregate</td>
</tr>
<tr>
<td></td>
<td>(i) Compressive strength of cement mortar</td>
</tr>
<tr>
<td></td>
<td>(j) Tensile strength of cement mortar</td>
</tr>
<tr>
<td>Material Testing</td>
<td>(a) Comp test of cast iron</td>
</tr>
<tr>
<td></td>
<td>(b) Rigidity modulus of Cast Iron</td>
</tr>
<tr>
<td></td>
<td>(c) Fatigue test of steel (cyclic loading)</td>
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</tbody>
</table>
4th Semester

BSCM 2202 MATHEMATICS - IV (3-1-0)

Module - I
Solution of equations by iteration, Newton’s method, Secant method, Interpolation
Numerical integration and differentiation

Module - II
Gauss Siedel iteration method for solving a system of linear equations, Runge Kutta Methods, Introductory Linear Programming, Introductory Programming

Module - III
Probability, Random variables, Probability distribution, mean & variance of distribution
Binomial, Poisson, hyper-geometric and normal distributions

Module - IV
Random sampling, estimation of parameters, confidence intervals, Testing of hypothesis, acceptance sampling, correlation and regression
Course covered by : Advance Mathematics by E. Kreyszig (8th Edition)
Chapter 17 (17.1 - 17.3, 17.5), Chapter 18 (18.4), Chapter 19 (19.1), Chapter 20, Chapter 21, Chapter 22

CPME 6202 MECHANICS OF MATERIALS - I (3-1-0)

MODULE - I (10 Hours)
1. Analysis of Axially Loaded Members :
   Composite bars in tension and compression - temperature stresses in composite rods -
   statically indeterminate problem.
2. Members in Biaxial State of Stress :
   Stresses in thin cylinders, thin spherical shells under internal pressure - wire winding of thin
   cylinders.

MODULE - II (12 Hours)
3. Strain Deformation :
   Two dimensional state of strain, Principal strains and principal axes of strain measurements,
   Calculation of principal stresses from principal strains.
4. Shear Force and Bending Moment Diagrams for Simple Beams :
   Support reactions for statically determinate beams, relationship between bending moment and
   shear force. Sheer force and Bending Moment diagrams.

MODULE - III (12 Hours)
5. Simple Bending of Beams :
   Theory of simple bending of initially straight beams, distribution of normal and shear stress,
   beams of two materials, Composite beams.
6. Deflection of Beams :
   Slope and deflection of beams by integration method and area - moment method.

MODULE - IV (6 Hours)
7. Torsion in solid and hollow circular shafts, Twisting moment, strength of solid and hollow
   circular shafts. Strength of shafts in combined bending and twisting.
TEXT BOOKS :
1. Elements of Strength of Materials by Timoshenko & Young (Fifth Edition)
   Chapter : 1, 2, 3, 4, 5, 6, 7 ,8 (Relevant articles only)

REFERENCE BOOKS :
2. Strength of Materials by G. H. Ryder

BSCC 2201 CHEMISTRY - II (3-0-0)
(Total No. of Lectures = 40)

Module I (10 Lectures)
Water quality parameters and standards. Treatment of water for industrial and domestic purpose. 

Module II (14 Lectures)
(To develop the basic concepts on corrosion and industrially important polymers.
1. Corrosion:
   Dry and wet corrosion, Galvanic Corrosion, Stress Corrosion, Factors affecting corrosion, Corrosion Control : (Proper design and fabrication procedure, Cathodic protection, Passivation).
   (6 Lectures)

2. Polymers:
   Nomenclature and classification, Mechanism of polymerization (free radical and ionic) Thermoplastic and thermosetting resins, Some typical useful polymers: Polyethylene, PVC, polystyrene, PMMA, Nylon 6 : 6, Nylon 6, Bakelite, Terylene, Silicones, Natural and synthetic rubbers: Neoprene, Butyl and Polyurethane rubber, Vulcanization.
   (8 Lectures)

Module III (10 Lectures)
(To introduce the students about the basic concepts of fuels)
1. Fuels:
   Classification of fuels, calorific value, Analysis of Coal, Manufacturing process of metallurgical coke, Refining of Crude oil, Fractional distillation, Cracking, Knocking and antiknocking, Octane and Cetane number.
   Gaseous Fuel : Producer gas, Water gas, LPG & CNG.
   Combustion Calculation.

Module IV (6 Lectures)
1. Environment pollution :
   Green house effect, acid rain, depletion of ozone layer; Water pollution- bio chemical effect of lead, arsenic, mercury and fluorides, sewage-B.O.D. and C.O.D.

Books:
3. Environmental Pollution, A.K. Dey.

BSCC 2202 MATERIAL SCIENCES (3-0-0)

MODULE - I (10 Lectures)

MODULE - II (10 Lectures)
5. Dielectric Materials : Microscopic Displacement of atoms and molecules in an external dc electric field, Polarization and dielectric constant, Dielectric susceptibility. Temperature dependence, Dielectric Breakdown. Ferro electric material Piezoelectrics, Pyroelectrics, Dielectric Materials as electrical isolators.

MODULE - III (10 Lectures)
   Plastics - Types : Thermosetting and thermoplastics. Transfer moulding, injection moulding, extension moulding, Blow moulding, Welding of plastics; Rubber types, application.
9. Ceramics : Types, Structure, Mechanical properties, applications

MODULE - IV (10 Lectures)

Text Books :
2. Vijaya M. S., Rangarajan G, Materials Science, TMH
3. Rajendra V., Marikani A., Materials Science, TMH
BSCP 2201 PHYSICS - II (3-0-0)

This one semester Physics course is divided into four units. The unit - I deals with some aspects of nuclear physics, unit - II introduces certain features of condensed matter physics, unit - III deals with certain aspects of semiconductors and superconductors and unit - IV introduces Opto-electronic devices and fibre-optic communication system.

Unit - 1
This unit covers the basic principles and applications of different types of accelerators and their important applications.

Detailed constructional features of accelerators are not necessary.
1. Need for nuclear accelerators.
3. RF accelerators : Linear accelerator, cyclotron, electron accelerator, betatron.

Unit - 2
This Unit deals with diffraction in crystals and its role in determining crystal structure.
Study of crystal structure by diffraction methods, Bragg’s condition for crystal diffraction, Lau condition, Miller indices, Reciprocal lattice, Geometrical structure factor, Atomic form factor.

Unit - 3
This unit deals with certain features of semiconductors and superconductors.
2. Superconductivity : Superconductors and their properties, Meisner effect, Type - I and Type - II Superconductors, Thermodynamic properties of superconductors, London equation, Application of superconductors.

Unit - 4
This unit introduces some Opto-electronic devices and fibre-optic communication system.
LED : Principle construction of operation and application, Introduction to fibre optics, basic characteristics of optical fibres, optical fibre communication system.

Books Recommended
1. Nuclear Physics, P. R. Roy & B. P. Nigan
2. Particle Accelerators, M. S. Livingston & J. P. Blewett
3. Concepts of Modern Physics, A. Beiser
4. Introduction to Solid State Physics, C. Kittel
5. Introduction to Lasers, A. Avadhnu
BSCP 2202 PHYSICS OF SEMICONDUCTOR DEVICES (3-0-0)

Module I
An appreciation of Quantum Mechanics in determining electrical properties of semiconductor.

The Semiconductor in Equilibrium:
Equilibrium distribution of electrons & holes, the n0 and p0 equation, intrinsic carrier concentration; Dopant atoms and energy levels, ionization energy; the extrinsic semiconductor, the n0 p0 product, position of Fermi-energy level, variation of EF with doping concentration and temperature.

Carrier Transport Phenomena:
Carrier drift: mobility, conductivity, velocity saturation;
Carrier Diffusion: Diffusion current density. Total current density. The Einstein relation.

Module II
Non-equilibrium Excess Carrier in Semiconductor
Excess carrier generation and recombination, characteristics of excess carriers-continuity equation and time – dependent Diffusion equation. Ambipolar Transport – Derivation of equation and applications.

The Pn junction and Diode
Basic structure, built-in potential barrier, Electric field, space charge width; Reverse applied bias-space charge width and Electric field. Junction capacitances.
Pn junction Diode : Ideal – current voltage relationship, Minority Carrier distribution, Ideal Pn junction currents under forward and reverse bias.

Module III
Pn junction diode (contd.):
Temperature effects, Small signal model of Pn junction, Equivalent circuits Recombination Current. Junction Breakdown.

Metal-Oxide- Semiconductor FET (MOSFET)
The MOS structure : Energy band diagrams, Depletion Layer thickness, Work function difference, Flat band Voltage, Threshold Voltage, Charge distribution, Capacitance –Voltage characteristics.

The basic MOSFET operation, Current –Voltage relation (Concepts)
Frequency limitation : Small signal Equivalent circuit.
The CMOS Technology.

Module IV
The Bipolar Transistor
Basic Principle of Operation., Simplified Transistor Current Relation. Modes of operation, Amplification with Bipolar transistors, Minority Carrier distribution Forward active mode, other modes of operation.
Text Book:
1. Semiconductor Physics and Devices- Basic Principles BY Donald A. Neamen, 3rd Edition, Tata McgrawHill Edition. (Selected portion from chapters 2,4,6,7,8,10 &11.)

For additional reading:

BCSE 3202 RELATIONAL DATABASE MANAGEMENT SYSTEMS (3-0-0)

Module I (10 Hours)
Database System Architecture - Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages.
Data models - Entity Relationship(ER), Mapping ER Model to Relational Model, Network.Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations.

Module II (10 Hours)
Relation Query Languages, Relational Algebra, Tuple and Domain Relational Calculus, SQL and QBE.
Relational Database Design: Domain and Data dependency, Armstrong’s Axioms, Normal Forms, Dependency Preservation, Lossless design, Comparison of Oracle & DB2

Module III (8 Hours)
Query Processing and Optimization: Evaluation of Relational Algebra Expressions, Query Equivalence, Join strategies, Query Optimization Algorithms.

Module IV (12 Hours)
Advanced topics: Object-Oriented and Object Relational databases. Logical Databases, Web Databases, Distributed Databases, Data Warehouse and Data Mining.

Text Books:-
2. C.J.Date - An introduction to Database Systems, Pearson Education

HSSM 4202 ORGANIZATIONAL BEHAVIOUR (3-0-0)

Module I (8 Hours)
Learning – Nature of Learning, How Learning occurs, Learning and OB.
Case Analysis

Module II (10 Hours)
Foundations of Individual Behaviour : Personality – Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.
Case Analysis
Module III

An Introduction to Transactional Analysis (TA).

Case Analysis

Module IV

Case Analysis

TEXTBOOKS:
Keith Davis, Organizational Behaviour, McGraw – Hill.

REFERENCE BOOKS:
Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.

HSSM 4201 ENGINEERING ECONOMICS AND COSTING(3-0-0)

Module I
Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

Module II
Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost – effectiveness analysis.

Module III

Text Book
1. Horn green, C.T., Cost Accounting, Prentice Hall of India

PCCI 8201 SURVEYING - I (3-1-0)

Module I
1. Linear measurement and chain survey: Use of various types of chains and tapes measurement of correct length of line, Direct and indirect ranging, chaining along sloping ground. Obstacle in chaining, errors and their elimination.

Module II
(12 Hours)
2. Compass surveying: Use of prismatic compass, temporary adjustment, bearing of a line, local attractions, correction of bearing.


**Module III**

4. Levelling: Use of dumpy level and levelling staff. Temporary and Permanent adjustments of dumpy level. Reduction of levels by H.I and rise and fall method. Curvature and refraction error, sensitiveness of level tube, reciprocal levelling, levelling difficulties and common errors.

**Module IV**


**Books:**

1. Surveying & levelling Vol - 1, T. P. Kanetkar & S. V. Kulkarni
2. Surveying - Vol - I, B. C. Purnia
3. Surveying, Husain & Nagnas

**PRACTICALS**

**BENG 9201 BASIC ELECTRICAL ENGINEERING LAB. (0-0-3)**

**List of Experiment (Any 8 of the following)**

1. Study and measurement the armature and field resistance of a DC machine.
2. Calibration of ammeter, voltmeter and wattmeter with the help of sub-standard instrument.
3. Verification of circuit theorems. Thevenin's and Superposition theorems (with DC source only).
4. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current, voltages and power in R-L-C series circuit excited by Single Phase AC supply.
6. Connection and starting of a three phase induction motor using direct online (DOL) or star-delta starter.
7. Connection and measurement of power consumption of a fluorescent lamp.
8. Determination of open circuit characteristics (OCC) of DC machine.
10. Connection and testing of a single phase energy meter (unity power factor load only)
11. Study of fan motor

**BENG 9202 BASIC ELECTRONICS LAB. (0-0-3)**

(At least 8 experiments including 1 - 7 and any one from 8 - 10)

1. Familiarity with electronics components and Devices
   Testing of a semiconductor Diode and a Transistor. IC pins connection (Digital Multimeter should be used should be used in testing components and devices).
2. Study and use of Oscilloscope to view waveforms and measure its amplitude and frequency.
4. Half wave and Full wave rectifiers without and with capacitor filter. Record of waveforms, Measurement of Average and rms values.
5. V - I Characteristics of anpn or pnp transistor. DC Biasing and measurement of dc voltages and currents.
7. Op amp in Inverting, non inverting, Integrating and Differentiating configuration, Record of wave forms.
8. Truth Tables of logic gates.
9. Study and experiment using MUX - DEMUX ICs / Shift Register IC.
10. Study on CMOS logic Inverter.

**BCSE 9202 COMPUTER (RDBMS) LAB. (0-0-3)**
(10 Classes for 10 Different Programs)
1. Use of SQL syntax : Insertion, Deletion, Join), Updation using SQL. (1 class)
2. Program segments in embedded SQL using C as host language to find average grade point of a student, etc.. (1 class)
3. Program for Log based data recovery technique. (1 class)
4. Program on data recovery using check point technique. (1 class)
5. Concurrency control problem using lock operations. (1 class)
6. Use of package (ORACLE) for programming approaches(2 classes)
7. Use of package (DB2) for programming approaches(2 classes)
8. Programs on JDBC/ODBC to print employee's / student's information of a particular department. (1 class)

**CPCE 9201 BUILDING DRAWING (0-0-3)**
1. Plan, elevation, side view of residential/office building
2. Drawing of 2 bedroom/3 bedroom houses (single and two storied), ground and first floor plans, elevation and section for load bearing and framed structures.
3. Detailing of doors/windows
4. Drawing of several types of footing, bricks work, floor, staircases, masonry, arches and lintels.
5. Types of steel roof trusses
6. Detailing of floor and wall joints.
7. Project on establishment like Bank building/Post Office/Hostel/Library/Hospital/Auditorium/Factory building, etc.

**BENG 9203 MECHANICAL ENGINEERING LAB. (0-0-3)**

**Group A (Mechanics / Material Testing Lab.**
1. Determination of equilibrium of coplanar forces.
2. Determination of Moment of Intertia of Flywheel

**Group B**
4. Determination of Metacentric Height and application to stability of floating bodies.
5. Verification of Bernoulli’s Theorem and its application to Venturi meter.
Group C
7. Calibration of Bourden Type Pressure gauj and measurement pressure using manometers.
8. Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine.

CPCE 9204 SURVEYING LAB. (0-0-3)
1. Testing of chain and measurement of correct length of the line.
2. Traversing by chain survey.
3. Traversing by Compass survey.
5. Traversing by plane table.
6. Use of dumpy level and fly levelling.
7. Longitudinal Section and Cross Section of Road.
8. Contouring
10. Traversing by theodolite.
### COURSE STRUCTURE
THIRD YEAR B.TECH PROGRAMME
CIVIL ENGINEERING

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<td>CPCE 8306 Steel Structure</td>
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<td>CPCE 8308 Irrigation Engineering</td>
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<td>CPCE 8310 Structural Analysis - II</td>
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<th>P-Practical</th>
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23
Course Objective: The course aims at acquainting the students to mathematical modeling of engineering design, operation and maintenance problems and their optimization algorithms.

Module – I (10 hours)
Formulation of engineering optimization problems: Decision variables, objective function and constraints. Example of typical design, operation and maintenance problems in engineering: Design of a water tank, design of a truss, design of a network (electrical, communication sewerage and water supply networks), product mix problem, transportation and assignment problems, shift scheduling of employees, design of reliable devices, design of reactors, shortest route problem, set covering problem, traveling salesman problems. Only physical problems and their mathematical models to be discussed.

Linear Programming Problem: Formulation, Graphical solution, Simplex method, Duality theory, Dual simplex method, Formulation and solution of engineering problems of planning and scheduling.

Module – II (10 hours)
Sensitivity Analysis, Transportation Problem, Assignment Problem, Network Models: Minimal Spanning Tree Problem, Maximal Flow Problem, Shortest Route Problem, Minimum Cost Flow Problem. Algorithms and applications to be covered.

Module – III (10 hours)

Module – IV (12 hours)
Queueing theory, Game theory, Simulation, Decision theory & Sequencing Problem

REFERENCES:
4. B.E Gillett, Introduction to operations research, TMH

CPCE 8301 CONCRETE STRUCTURE –I (3-1-0)

Module - I
Properties of Concrete and reinforcing steels, Introduction to limit state method: application to Rectangular, Tee and Ell beams, for flexure, shear and torsion.

Module – II
Doubly reinforced beams, columns with axial and biaxial loading,

Module III
One way and two way slabs. Isolated column footing, stair cases

Module IV
Design of water tanks, Footings, building portals

Reference Books:
1. Reinforced Concrete- Limit State, A.K. Jain
2. Composite R C C Design, B.C. Purnia etal , Laxmi Publication
3. Limit State Design of Reinforced Concrete, P.C. Verghese, Prentice Hall India

CPCE 8302 TRANSPORTATION ENGINEERING-I (3-1-0)

Module – I
Introduction: Modes of Transportation, their importance and limitations, the importance of highway transportation.

Highway Planning: Principles of Highway planning, Road development and Financing, Privatization of Highways, Highways Alignment requirements, engineering surveys for Highway location.

Module – II
Geometric Design: Cross section elements, width camber, super elevation, Design speed, Sight distances, Requirements and design of horizontal and vertical alignment, Horizontal and Vertical curves.


Module – III
Design of flexible pavements, Design of low volume road and high volume roads, IRC design method for flexible pavements and rigid pavements.

Module - IV
Highway drainage: Surface drainage and subsoil drainage, Pavement failures, Maintenance and Strengthening.


Bridge site selection, types of bridges, superstructure, detail bridge foundation.

Textbooks:
2. Highway Engineering, L. R. Kadiyali, Khanna Publishers

CPCE 8303 GEOTECHNICAL ENGINEERING - I (3-0-0)

Module –I
Introduction: Basic terminology and inter-relations, index properties of soils.

Soil classification: Particle size distribution, use of particle size distribution curve, textural classification, HRB classification, Unified soil classification system, Indian standard soil classification system (I.S. 1498 – 1970)

Soil moisture: Adsorbed water, capillary water, effective stress, pore pressure and total stress.

Module – II
Permeability: Darcy’s law, permeability, factors affecting permeability, determination of coefficient of permeability (laboratory and field methods), permeability of stratified soil deposits. Estimation of yield from wells. Seepage analysis: Seepage pressure, quick condition, Laplace equation for two-dimensional flow, flow net, properties and methods of construction of flow net, application of flow net, seepage through anisotropic soil, seepage through earth dam.

Soil compaction: Compaction mechanism, factors affecting compaction, effect of compaction on soil properties, density moisture content relationship in compaction test, standard and modified proctor compaction tests, field compaction methods.

Module – III
Soil consolidation: Introduction, spring analogy, one dimensional consolidation, Terzaghi’s theory of one dimensional consolidation, consolidation test, determination of coefficient of consolidation.
Module – IV
Shear strength of soil: Mohr’s stress circle, theory of failure for soils, determination of shear strength (direct shear test, triaxial compression test, unconfined compression test, vane shear test)
Shallow foundation: Introduction bearing capacity, methods and determination of bearing capacity, settlement of foundation.

Reference Books
2. Geotechnical Engineering, C. Venkatramaih, New Age International Publishers
3. Foundation Engineering, P. C. Verghese, Prentice Hall of India

CPCE 8304 BUILDING MATERIALS AND CONSTRUCTION (3-0-0)

Module – I
Brick
Methods of bricks manufacture, testing of bricks
Cement. Classification, chemical composition, hydration, tests for cement.
Concrete:
Composition, water – cement ratio, workability, mix design.

Module – II
Masonry arches: Terms used, types of arches, stability, line of thrust, depth of arch at the crown.
Cavity Walls: Purpose, method of construction
Stairs: Terms used, types of stairs, essential requirements, wooden stairs, concrete stairs, metal stairs.

Module – III
Plastering: Materials for plastering, methods of plastering, defects in plastering and remedy.
Damp prevention: causes, effects, different methods of prevention of dampness.

Module – IV
Painting and decoration: oil painting and varnishing, enamel painting, washes and distemper, defects in painting.
Glazing: Varieties of glass, decorative glass, door and window glazing.
Repair of buildings:
Annual and special repair of buildings. Maintenance of buildings

REFERENCE BOOKS:
2. A Textbooks of Building Materials, C. J. Kulkarni

CPCE 8305 MECHANICS OF MATERIAL – II (3-0-0)

Module – I
1. Energy Method based on strain energy due to bending: strain energy due to axial load, bending moment and twisting moment, principle of virtual work, Castigliano’s theorem, Maxwell’s theorem of reciprocal relations, Unit load and couple method for determining deflection and slope, Rayleigh-Ritz method.

Module II
2. Thick Walled cylinders:
Thick cylinders subjected to internal and external pressures compound cylinders, Application of computer in analyzing stresses in thick cylinders.

3. Unsymmetrical bending:

Properties of beam cross selection, slope of neutral axis, stresses and deflection in unsymmetrical bending, shear centre.

Module III (10 hours)

4. Curved Beam:

Bending of beam with large initial curvature, Stress distribution in beam with rectangular, circular and trapezoidal cross section, stresses in crane hooks, ring and chain links.

5. Elementary concept of elasticity, stresses in three dimensional, equation of equilibrium and compatibility, plane stress, computer analysis of two dimensional state of stress or strain at a point.

Module – IV (12 hours)

Advanced topics in strength of materials

6. Repeated stresses and fatigue in metals, concept of stress, Concentration, notch and stress concentration factors.

7. Experimental stress analysis:

Resistance strain gauges, strain Rosettes, Two dimensional photoelastic methods of stress analysis, stress optic law, light and dark field in a polariscope, Isoclinic and Isochromatic fringe patterns, Computer Analysis of strain from strain rosette measurement.

Textbook:

1. Advanced Mechanics of Solids, L.S. Srinath, TMG,
2. Advanced Mechanics of Materials, Kumar & Ghai, Khanna Publisher

PRACTICALS

CPCE 9301 GEO-TECHNICAL ENGINEERING LAB. (0-0-3)

(Relevant I.S codes may be referred)

1. Determination of specific gravity of soil grains
2. Determination of grain size distribution of soil
   (a) Sieve test (b) Hydrometer/ pipette test
3. Determination of Atterberg limits of soil
   (a) Liquid limit (b) plastic limit (c) shrinkage limit
4. Measurement of soil compaction in the field
   (a) Core cutter method (b) Sand replacement method
   (a) Proctor compaction test (ii) Modified Proctor compaction test (c) Use of Proctor penetration needle
6. Determination of relative density of granular soil
7. Determination of shear strength parameters of soil
8. (a) Shear Box test (b) Tri-axial compression test (c) Unconfined compression test  (d) Vane shear test

9. Determination of consolidation characteristics of soil using fixed ring Oedometer

10. Determination of California Bearing Ratio (CBR) of soaked and un-soaked soil specimens

11. Determination of coefficient of permeability of soil
(a) Constant head permeameter (b) Falling head permeameter

**CPCE 9302 CONCRETE STRUCTURE DESIGN – I LAB. (0-0-3)**
(IS 456: 2000 and SP 16 are to be used)

1. Design of rectangular, Tee Beam, and Ell beam for flexure, shear and torsion
2. Design of Double reinforced rectangular beam
3. Design of columns with axial, eccentric and biaxial loading
4. One way and two way slab, Isolated column footings
5. Stair case design, design of combine footing

**CPCE 9303 CIVIL ENGINEERING LAB. - II (0-0-3)**
(Relevant I.S codes may be referred)

A. **Hydraulics Lab**
1. Experiment on impact of jet
2. Experiment on centrifugal pump
3. Experiment on Francis turbine
4. Experiment on Pelton wheel

B. **Concrete and structure lab**
5. Failure of beam in bending
6. Failure of beam in shear
7. Design of concrete mix (Indian standard method)
8. Prism test

C. **Environmental Engineering Lab**
9. Determination of physical characteristics of water-taste, odour, turbidity, colour, pH value, dissolved and suspended solid.

D. **Transportation Engineering Lab**
11. Quality control tests on highway materials, bitumen, aggregate.
12. Roughness measurement of pavements.
6th Semester

HSSM 4302 PRODUCTION AND OPERATIONS MANAGEMENT (3-0-0)

**Objective:** This course aims at acquainting all engineering graduates irrespective of their specializations the basic issues and tools of managing production and operation functions of an organization.

**Module I**


**Module II**

4. **Location and Layout Planning : Factor Influencing Plant and Warehouse Locations, Impact of Location on cost and revenues. Facility Location Procedure and Models : Qualitative Models, Breakeven Analysis, Single Facility, Location Model, Multi-facility Location Model, Mini max Location, Total and Partial Covering Model.**

5. **Forecasting : Principles and Method, Moving Average, Double Moving Average, Exponential Smoothing, Double Exponential Smoothing, Winter’s Method for Searonal Demand, Forecasting Error Analysis.**

**Module III**


Module – IV (11 hours)


10. Modern Trends in Manufacturing : Just in Time (JIT) System; Shop Floor Control By Kanbans, Total Quality Management, Total Productive Maintenance, ISO 9000, Quality Circle, Kaizen, Poke Yoke, Supply Chain Management

Reference :

CPCE 8306 STEEL STRUCTURE (3-1-0)

Module – I
Revetted and welded connections
Design of tension and compression members. Design of columns, Lacings, Battens,

Module – II
Column bases and foundations. Design of beams

Module – III
Plate Girders and gantry girders, Design of roof trusses

Module – IV
Rivetted and pressed elevated steel tanks and staging.

REFERENCE BOOKS :
1. Arya & Ajmani, Design of Steel Structures
2. Kazmi and Jindall, Design of steel Structures
3. Punmia. BC etal , Design of Steel Structures
4. Negi L.S., Design of Steel Structures

CPCE 8307 SURVEYING – II (3-0-0)

Module – I
Introduction, Horizontal distance measurements, electronic distance measurement theodolite,

Module –II
Triangular measurements. Traverse survey and computation.

Module – III
Total station instrument, vertical distance measurement, Trigonometric levelling, contouring, stadia tacheometry, different types of tacheometric measurements.

Module – IV
Introduction to photogrammetric surveying and mapping. Remote sensing and mapping Global positioning system.
REFERENCE BOOKS:
2. Surveying, Vol II and III, B.C. Punmia

CPCE 8308 IRRIGATION ENGINEERING (3-0-0)

Module – I
Hydrology
Hydrological Cycle, hydrograph, measurement and analysis of precipitation and run off, flood routing.
Water requirement of crops, factors affecting water requirement, crop season, crop period, base, delta and duty, consumptive use of water, frequency of irrigation, irrigation efficiency.

Module – II
Systems of irrigation, lift irrigation, flow irrigation, methods of distribution of water (brief description only)
Flow irrigation, selection of dam or barrage site, types of canals, alignment of canals, design of canal section, Kennedy and Lacey’s theory, canal lining, canal head works.

Module - III
Weir and barrage, types of weirs and barrages and their components, Bligh’s Creep theory, Khosla’s theory.
Spillways, type, Energy dissipators, Cross drainage works.

Module – IV
Dams, Classification of dam, force acting on gravity dam, economical height of dam, stability analysis of dam. Earth dam, Causes of failure of earth dam.
Water logging, causes and effects, anti-water logging measures.

REFERENCE BOOKS:

CPCE 8309 WATER SUPPLY AND SANITARY ENGINEERING (3-0-0)

Module – I
General requirement for water supply, sources, quality of water, intake, pumping and transportation of water. Physical, chemical and biological characteristics of water and their significance, water quality criteria, water borne diseases, natural purification of water sources.

Module – II
Engineered systems for water treatment: aeration, sedimentation, softening coagulation, filtration, adsorption, ion exchange, and disinfection. Water distribution system.
Generation and collection of waste water, sanitary, storm and combined sewerage systems, quantities of sanitary waste and storm water, design of sewerage system
Primary, secondary and tertiary treatment of wastewater. Waste water disposal standards,

Module – III
Basic of microbiology. Biological wastewater treatment system: Aerobic processes activated sludge process and its modifications, trickling filter, RBC, Anaerobic Processes conventional anaerobic digester, High rate and hybrid anaerobic reactors, Sludge digestion and handling, Disposal of effluent and sludge

Module – IV
Design problems on water distribution, sewerage, water treatment units, wastewater treatment units and sludge digestion.

**REFERENCE BOOKS :**
1. Water Supply and Sewerage, E.W. Steel
3. Sewerage and Sewage Treatment, S.R. Kshirasagar

**CPCE 8310 STRUCTURAL ANALYSIS -II (3-0-0)**

**Module – I**
Analysis of continuous beams and plane frames by slope deflection method and moment distribution method.

**Module - II**
Analysis of Continuous beam and simple portals by Kani’s method. Analysis of two pinned and fixed arches with dead and live loads, Suspension cables with two pinned stiffening girders.

**Module – III**
Analysis of redundant plane trusses, matrix, methods of analysis : Flexibility and stiffness, methods ; Application to simple trusses and beam

**Module – IV**

**REFERENCE BOOKS :**
2. Structural Analysis, V.S Prasad

**PRACTICALS**

**CPCE 9304 WATER SUPPLY AND SANITARY ENGINEERING DESIGN (0-0-3)**
1. Design of City water supply system
2. Design of water treatment plant
3. Design of sewerage network
4. Design of sewerage treatment plant

**CPCE 9305 IRRIGATION ENGINEERING DESIGN (0-0-3)**
1. Design of different types of dams
2. Design of different types of spillways
3. Design of head regulator and cross head regulator
4. Design of channel
5. Design of cross drainage houses, fall and river training works.

**CPCE 9306 CONCRETE STRUCTURE DESIGN –II (0-0-3)**
(IS 456 : 2000 and SP :16 are to be used)
1. Design of a multistoried building including slabs and footings
2. Design of water tanks
3. Design retaining walls
4. Bridge design
# COURSE STRUCTURE
## FOURTH YEAR B.TECH PROGRAMME
### CIVIL ENGINEERING

### 7th Semester

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<td>CPCE 8401</td>
<td>Computer Aided Design</td>
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<td>Transportation Engineering -II</td>
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<td>PECE 8401</td>
<td>Environmental Impact Assessment</td>
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<td>PECE 8403</td>
<td>Ground Improvement Technique</td>
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<td>Construction Machinery &amp; Mgmt.</td>
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<td>Quality Estimation and Project Mgt.</td>
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<tr>
<td>PECE 8410</td>
<td>Structural Dynamics</td>
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<td>PECE 8411</td>
<td>Advanced Foundation Engineering</td>
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<td>PECE 8412</td>
<td>Plates and Shells</td>
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<tr>
<td>PECE 8413</td>
<td>Traffic Engineering &amp; Transportation Planning</td>
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### Practical/Sessionals

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Contact Hours</th>
<th>Credit</th>
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<tbody>
<tr>
<td>CPCE 9401</td>
<td>Project</td>
<td>3</td>
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<tr>
<td>CPCE 9402</td>
<td>Steel Structure Design Lab.</td>
<td>0-0-3</td>
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<tr>
<td>CPCE 9403</td>
<td>Computer Aided Design Lab.</td>
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<tr>
<td>CPCE 9404</td>
<td>Seminar</td>
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**L-Lecture**

**T-Tutorial**

**P-Practical**

**Total**

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33
Objective: This course introduces the students to the environmental consequences of Industries, development actions etc. and the methods of minimizing their impact through technology and legal systems.

Module – I (10 hours)


Chemistry and Microbiology in Environmental Engineering: Physical and chemical properties of water, Atmospheric chemistry, Soil chemistry, Microbiology, Chemical and biochemical reactions, Material balances and Reactor configurations.


Module – II (9 hours)

Water Pollution: water quality standards and parameters, Assessment of water quality, Aquatic pollution, Freshwater pollution, Estuarine water quality, Marine pollution, Organic content parameters, DO and BOD demand in streams, Transformation process in water bodies, Oxygen transfer by water bodies, Turbulent mixing, Water quality in lakes and preservers, Ground water quality.

Air Pollution: Air pollution and pollutants, criteria pollutants, Acid deposition, Global climate change – green house gases, non-criteria pollutants, emission standard form industrial sources, air pollution metereology, Atmospheric dispersion.


Module – III (15 hours)


of bio-solids, first and second stage processing of sludge. Sludge disposal, Integrated sewage and sludge management.

**Solid Waste Management:**

Source classification and composition of MSW: properties and separation, storage and transportation, MSW Management, Waste minimization of MSW, Reuse and recycling, Biological treatment, Thermal treatment, Landfill, Integrated waste management.


**Industrial Air Emission Control:**

Characterization of air stream, Equipment selection, Equipment design, Special Methods: Flue gas desulphurization, NOx removal, Fugitive emissions.

**Module – IV**  

Environment impact Assessment, Origin and procedure of EIA, Project Screening for EIA, Scope studies, Preparation and review of EIS.

**REFERENCE:**

3. Environmental Science, Curringham & Saigo, TMH,
4. Principles of Environmental Science, Curringhum
5. Introduction to Environmental Science, Y. Anjaneyalu, B. S. Publication.

**CPCE 8401 COMPUTER AIDED DESIGN (3-1-0)**

**Module – I**

Introduction to CAD, Description of Computer hardware and software, use of graphic terminal, various commands Generation of points

**Module – II**

Various forms of lines including curved lines, 2D transformations, 3-D transformations, hidden line removal, Data base management, Application of graphics packages.
Module – III
Matrix methods of structural analysis and associated computer programmes, Introduction to interactive computer programmes for design and detailing of structural elements, RCC-slab, beams columns, isolated footing etc.

Module – IV
Steel – Typical members and connection

CPCE 8402 TRANSPORTATION ENGINEERING- II (3-1-0)

Module – I
History of Indian Railways, Component parts of railway track, Problems of multi gauge system, wheel and axle arrangements, Coning of wheels, various resistances and their evaluation, hauling capacity and tractive effort, stresses in rail, sleepers, ballast and formation.
Permanent way component parts : Types of rail section creep, wear and failure in rails, Rail joints, rail fittings, bearing plates, anti-creep devices, check and guard rails, Ballast requirements, Specifications, Formation, Cross section, drainage.

Module – II
Geometric design : Alignment, horizontal curves, super elevation, equilibrium cant and cant deficiency, Length of transition curves, Gradients and grade compensation, vertical curves.
Point and crossing : Design of simple run out, various types of track junction and their configurations.

Module – III
Signaling and Interlocking : Control of train movement and monitoring, types of signals, principles of interlocking
Air Transport Development : Airport scenario in India –Stages of development, Aircraft characteristics, airport planning, site selection, Obstruction and zoning laws, imaginary surfaces, Approach zones and turning zones.

Module IV
Runways and Taxiway Design : Elements of runway, orientation and configuration, Basic runway length and corrections, Geometric design elements, Taxiway design, Main and exit Taxiway, Separation clearance, Holding aprons, Typical airport layouts, Terminal building, gate position.
Visual Aids and Air Traffic Control : Airport marking and lighting, Airway and airport traffic control, Instrumental landing systems and Air navigation aids.

Textbooks :
1. Railway Engineering, M.M. Agrawal, Prabha & Co, New Delhi
2. A Text Book of Railway Engineering, Dhanpat Rai & Sons
3. Railway Track Engineering, Tata McGraw Hill
CPCE 8403 CONCRETE STRUCTURE – II (3-0-0)

Module – I
Materials for pre-stressed concrete: Basic principles. Pre-stressing systems. Pre-tensioning and post tensioning losses in pre stress.

Module – II
Analysis of sections for failure, Design of simply supported beams and slabs.

Module – III
Principle of design of continuous beams for two equal spans.

Module – IV
Circular pre-stressing, Limit state method of design pre-stressed concrete beams.

REFERENCE BOOKS:
1. Dayaratnam, P “Pre-stressed Concrete Structure”, Oxford and IBM
2. Raju, N.K., Pre-structure Concrete – Tata McGraw Hill

PECE 8401 GEOTECHNICAL ENGINEERING – II (3-1-0)

Module – I
Stress distribution in soil: Boussinesq and Westergaard solution for point load, line load, strip load, uniformly loaded circular and rectangular areas. Stress isobar and pressure bulb concept. Pressure distribution on horizontal and vertical planes at various loading conditions. Use of New-mark’s chart. Approximate methods equivalent point load methods and two-is-to one method. Contact pressure distribution due to loaded areas. Concept of active zone in soil.

Module – II
Lateral earth pressure and retaining structures: Earth pressure at rest, active and passive earth pressure. Earth pressure theories, Rankine’s theory, Columb’s Wedge theory. Rebhann’s and Culmann’s graphical methods, stability conditions for retaining walls.

Module – III

Subsoil exploration: Methods, direct (test pits, trenches), semi-indirect (borings), indirect (sounding, penetration tests and geophysical methods)
Planning of exploration programme, spacing and depth of boring, soil sampling, types of samples, standard penetration test, static and dynamic cone penetration test, in-situ vane shear tests.
Geophysical methods, seismic refraction and electrical resistivity methods.

Module – IV
Deep foundation:
Classification of pile, pile driving methods, pile capacity (static analysis, dynamic analysis) pile-group analysis, load test on piles.

Rock mechanics:
Introduction, problems, defects in rock mass, joints, faults, folds, Methods of geophysical prospecting, seismic and electrical method.

Reference Books:
1. Geotechnical Engineering, C. Venkatramaiah, New Age International

PECE 8401 ENVIRONMENTAL IMPACT ASSESSMENT (3-0-0)
Module –I
Introduction : Environmental pollution and control, basic principles of management.
Environmental policies and legislation : Rule, Act, Code, standard, criteria, specification.

Module –II

Module –III
Environmental impact : Environmental inventories, environmental assessment, evaluation.
Socio economic impact assessment, Financing of capital expenditure, increases in user charges, sociological impacts.

Module – IV
Role of environmental impact assessment in planning and decision making processes.
Environmental impact statement case studies.

Reference Books:

PECE 8402 GROUND WATER ENGINEERING (3-0-0)
Introduction, Hydrologic cycle and processes storage and conduit function of rocks, water bearing properties of rocks
Aquifers, storage coefficient of aquifers, recharge and discharge areas.
Ground water flow, properties of water in relation to flow, laminar and turbulent flow, Darcy’s law, formation constants, transmissivity, Flow thorough aquifers.

Evaluation of aquifers properties, confined aquifers, unconfined and semi confined aquifers, transition from artesian to water table conditions.

Quality of ground water, bacteriological and chemical qualities, salinisation of ground water, quality criteria for ground water use. Ground water pollution, factors, sources and nature of pollution, pollution mechanism.

Saline water intrusion, ground water extraction and intrusion, prevention and control of saline water intrusion.

Construction, design and performance of wells, types of wells and method of construction, tube well design, well development, maintenance and revitalization of wells, well performance tests.

Artificial recharge, methods, Induced recharge method, Recharge well method. Waste water recharge.

Textbooks :

PECE 8403 GROUND IMPROVEMENT TECHNIQUES (3-0-0)

Module – I
Introduction, Necessity of ground improvement, Dewatering, methods, Analysis and design of dewatering systems.

Grouting types, Properties, Method of grouting, Ground selection and control.

Module – II
Compaction, Methods of compaction, Engineering prosperities of compacted soil, Field compaction and its control.

Module – III
Soil stabilization, Use of chemical additives, Stone columns, Principle, design and method of installation.

Module – IV
Reinforced earth, Concept, Materials, Application and design, Use of geo-synthetics and geo-cells in construction work.

Textbooks :
1. Foundation Design and Construction, M.J. Tomlinson
3. Modern Geotechnical Engineering, Alam Singh, IBT Publishers
PECE 8404 CONSTRUCTION MACHINERY AND MANAGEMENT (3-0-0)

Module – I
Construction equipments:
Different types of construction equipments, earth moving, dewatering and pumping, grouting, pile driving equipments.
Conveyors, cranes, Concrete mixture, Vibrators, Rollers, Compactors and other road construction equipments.
Factors affecting selection of construction equipments

Module – II
Equipments management, Productivity, Operational cost, Owning and hiring cost, Work motion study.
Objectives and functions of construction management. Finance and cost accounting, Quality control, safety and safety measures in construction works.

Module – III
Network techniques, Introduction to CPM/PERT methods and their use in construction planning.
Construction schedules for jobs, materials, equipments, labour and finance.

Module – IV
Contract Management:
Legal aspects, contract laws related to land acquisition, labour safety and welfare. Different types of contracts, their relative advantages and disadvantages. Elements of tender operation. Evaluation of tenders, Award of work, Disputes and arbitration.

Textbooks:
2. Construction Planning and Management, Mehesh Verma
3. PERT & CPM, L.S. Sreenath, East West Press

PECE 8405 FINITE ELEMENT METHOD (3-0-0)

Module – I
Introduction to elasticity:
Energy, variational principles and Ritz technique, coordinates and shape function, patch test for one dimensional elements: Local and global coordinate system, element stiffness matrix, global stiffness matrix, boundary conditions, load matrices, Inversion of global matrix and determination of displacement strains and stresses.

Module – II
Cst element, Axi-symmetric element

Module – III
Isoparametric element, 3D element

Module – IV
Vibration : eigen vectors, eigen value-eigen vector, evaluation, generalized Jacobi method, Tridiagonilization.

REFERENCE BOOKS :
1. Finite Element Analysis, C.S. Krishna Murthy
2. Introduction to Finite Elements in Engineering, T.P. Chandrupatla and A.D. Belegundu

PECE 8406 QUALITY ESTIMATION AND PROJECT MANAGEMENT (3-0-0)
Module – I
Quality estimation :
Principles of estimation, methods and units, Estimation of materials in buildings, Culverts and bridges.

Module II
Principles of general and detailed specification for various types building works.

Module – III
Analysis of rates, description, Prime cost, Schedule rates, Analysis of rates for various types of works.

Module – IV
Network techniques, Introduction to CPM/ PERT methods and their use in project planning construction schedules for jobs, materials equipments, labour and finance.

Textbooks :
2. PERT and CPM, L.S. Sreenath, East West Press

PRACTICALS
CPCE 9402 STEEL STRUCTURE DESIGN LAB. (0-0-3)
1. Detailing of riveted, bolted and welded connections with shear and torsion; shear and bending
2. Detailing of end connections of compression and tension members, detailing for lacing and battening
3. Detailing of column bases and foundations, detailing of slab base, gusseted base and grillage foundation.
4. Detailing of structural steel connections, seated and framed connections.
5. Detailing of steel roof trusses/ industrial buildings
6. Detailing of plate girders, vertical, and horizontal stiffeners bearing stiffeners, web splices.

CPCE 9403 COMPUTER AIDED DESIGN LAB. (0-0-3)
Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/service packages keeping competitive market, customers and cost in view.

Module – I  
(9 hours)
Marketing Management: Concept, Process, Functions and relevance in the current context.
Competition Analysis: Factors contributing to competition, Competition analysis tools, Competitive arena mapping, Segmentation matrix.

Module II  
(10 hours)
Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research, Competitive Intelligence.
Consumer Behaviour: Importance of buyer and his/her role in purchasing. Influence of buyer behaviour, Buyer behaviour study tools. Organizational buying behaviour.
Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools: Buying Intention Survey, Sales Force Opinion and Delphi Techniques.

Module – III  
(11 hours)

Module – IV  
(10 hours)
Channels of Distributions: Designing Distribution Channels, Wholesaling and Physical Distribution, Retailing. Supply Chain Management (Basic only). Personal selling, Direct Marketing, Managing Sales Force.
References:

CPCE 8404 PRESTRESSED CONCRETE (3-1-0)

Module I
Prestressing system, materials and codes: Basic concept, Losses of prestress, analysis of prestress and bending stresses.

Module – II
Design of beams: Analysis and design of section for bending and shear, bending of cables, limit state analysis and design, anchorage zone stresses, design of end block, Application to bridges.
Selection of prestress concrete members, short term and long term deflections of uncracked members.

Module – III
Flexural strength of prestresed concrete sections
Continuous beams, Design concept concordancy of cables, Secondary design consideration.

Module – IV
Design pre-tensioned and post tensioned beam

Textbooks:
Prestressed Concrete, Raju, N.K., Tata McGraw Hill

PECE 8407 POLLUTION MEASUREMENT AND CONTROL (3-0-0)

Module – I
Introduction: Environmental pollution, air pollution
Environmental pollution: causes, nature and scope of environmental pollution, pollution and economic growth, energy growth, human environmental disturbances.

Module – II
Environmental policies and legislation: rule, act, code, standards, criteria, specification.
Air Pollution: Type of pollutants and sources, Natural and manmade sources, emission factors.

Module – III
Effect of air pollution: Plant damage, corrosion, human health-respiratory system, special diseases.
Air quality and emission standards: criteria and standards, pollution control laws.

Module – IV
Pollution control strategies: Dispersion and diffusion of pollutants in air and water, ground water pollution, leachate and gas movement in land fills.
Various pollution control devices/ measures

REFERENCE BOOKS:
1. Introduction to environmental Engineering and Science, G.M. Masters, Prentice Hall of India
PECE 8408 ENVIRONMENTAL GEOTECHNIQUE (3-0-0)

Module – I
Introduction: Scope, importance, waste generation, subsurface contamination.
Geosynthetics: Types, manufacturing functions, applications and economics.

Module – II
Forms of Waste and their properties: Municipal waste, mineral waste, industrial waste, hazardous waste, index properties, strength, compressibility and permeability of municipal and mineral waste.

Module – III
Selection of waste disposal sites, Factors affecting site selection, siting criteria and siting rating method. Land fills for municipal and hazardous waste: components of land fills, layouts, daily cells, Basal lining systems, stability of slopes, constructing aspects.

Module IV
Ash ponds and mine tailing impoundments: slurry deposition of mine tailing and coal ash in impoundments. Layout, components, design of tailing dam/ash dykes. Slope stability.
Remediation: Principle of remediation: Planning, source control, soil gas extraction, soil washing, bioremediation.

Reference Books:

PECE 8409 WATER RESOURCE MANAGEMENT (3-0-0)

Module – I
Introduction: Role of water in national development, assessment of water resources of country, scope of water resources development in context of environment.

Module – II
Water resources planning process, planning for single purpose and multipurpose projects, estimation of different water needs and project formulations, comparison of alternatives, cost benefit analysis. Introduction to optimization techniques and systems approach.

Module – III
Evaluation and monitoring of water quality and quality managing water distribution networks for irrigation, flood control and power generation, inter-basin transfer of water.

Module – IV
Conjunctive use of surface and ground water, water quality and quality modeling, evaluation of impacts of water resources projects on river regimes and environment, reservoir sedimentation and watershed management.

Reference Books:

PECE 8410 STRUCTURAL DYNAMICS (3-0-0)

Module I
Single degree of freedom systems. Steady state and transient motion, Damping, Free vibration.

Module II
Multi degree of freedom systems. Natural modes, Forced vibration problems, Continuous systems

Module III
Longitudinal flexural and torsional vibration of rods, Eigen values and eigen functions, Raleigh’s Principles, Ritz Method.

Module IV
Moving loads on beams, Lagrange’s equation of motion and applications.

REFERENCE BOOKS:
1. Theory of Vibration with application, W.T. Thomson
2. Dynamics of Structures, W.C Hurdy and M.F. Rubinstein
3. Mechanical Vibration and Analysis, P. Srinivasan
4. Mechanical Vibration, Timeshenko

PECE 8411 ADVANCED FOUNDATION ENGINEERING (3-0-0)

Module – I
Foundation subjected to Vibration:
Introduction, type of machine foundation, single degree freedom system, free and forced vibration with and without damping. Parameters influencing the design of machine foundation. Measurement of dynamic soil parameters.

Module – II
Sheet pile walls: Cantilever and anchored sheet pile walls, methods of analysis, Vertical cuts and ditches, earth pressure analysis,

Module – III
Coffer dams: Types, description
Floating foundation: Introduction, type methods to prevent floatation, necessity of using raft for full floating foundation.

Module – IV
Foundation on expansive soil: Shrinkage and expansion of clays, identification of expansive soil, swelling pressure measurement, causes and type of damages in building on expansive clays, Principles of design of foundation in expansive soil deposits.

REFERENCE BOOKS:
1. Handbook of Machine Foundation, P. Srinivasulu and C.V Vaidyanathan, TMH, New Delhi
2. Foundation Engineering, P.C. Verghese, Prentice Hall of India

PECE 8412 PLATE AND SHELLS (3-0-0)

Module – I
Structural behaviour of beams, plate and shells, Pure bending of plates

Module – II
Circular plates

Module – III
Rectangular plates, (a) Levy’s Solution (b) Navier’s Sol

Module – IV
Membrane theory of shell

REFERENCE BOOK:
1. Element of Plate Analysis, Jaeger
2. Theory of Plates and Shells, Limoshank
PECE 8413 TRAFFIC ENGINEERING AND TRANSPORTATION PLANNING (3-0-0)

Module – I
Traffic Engineering Definition: Organisation of the traffic engineering department, importance under Indian conditions.
Road user characteristics, Human factors governing road user behaviour, Vehicle characteristics, Slow moving traffic characteristics in India.

Module – II
Speed, Journey time, Delay surveys, Traffic flow parameters, Speed, diversity and volume relationships.

Module – III
Parking types, off street parking. Facilities, Traffic regulation, Traffic management measures.
High capacity analysis, Capacity of freeways and express ways in rural areas.

Module – IV
Design of rotary intersection and capacity of rotary intersection.
A transport planning morphology, Travel demand forecasting process, Hierachical and levels of urban transport planning, Trip generation analysis, Travel demand forecasting, Model split analysis, Trip distribution analysis.

Textbooks:
1. Principles of Urban Transport System Planning, B.G. Hutchinson
2. Traffic Engineering and Transport Planning, L.R. Kadiyali

CPCE 9407 ENTREPRENEURSHIP PROJECT (0-0-3)

1. The project will be for 2 credits and 3 periods per week is to be devoted for the project.
2. The teacher has to give elementary idea about entrepreneurship through classroom teaching before a project report is prepared by the student.
3. The teacher will first cover the following topics through lecturer and exercises on motivation and games.
   • Entrepreneurship concept, EDP in India, Indian middle class value.
   • Entrepreneurial qualities, motivation perception, risk taking etc.
   • Market survey, Business opportunity guidance
   • Role of DIC, SFC, Bank etc.
   • Working capital assessment, Balance Sheet, Costing, Book keeping.
   • Decision making, Leadership, Communication skill
   • Preliminary Project Report, preparation for a specific product and submission of the report.
4. Evaluation
   (a) The teacher has to conduct tests/ motivational exercises to assess entrepreneurial capability of the student (20%)
   (b) The teacher has to test the knowledge of the student on the above topic through a written test. (20%)
(c) The teacher has to evaluate the report submitted by the student (i.e. Project report within 50 pages) (60%).

REFERENCE BOOKS:
1. Entrepreneurship of Small Industries, M. V. Deshpande, Deep and Deep Publication