DETAILED SYLLABUS

Semester III

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme corecourse-1	CEPC-301	Building Materials and Construction	3	0	0	3	3
2	Programme corecourse-2	CEPC-302	Surveying	3	0	0	3	3
3	Programme corecourse-3	CEPC-303	Concrete Technology	2	0	0	2	2
4	Programme corecourse-4	CEPC-304	Mechanics of Solids	3	0	0	3	3
5	Programme corecourse-5	CEPC-305	Geotechnical Engineering	2	1	0	3	3
6	Programme corecourse-6	CEPC-306	Construction Materials & Mechanics of Materials Lab.	0	0	2	2	1
7	Programme corecourse-7	CEPC-307	Surveying Lab.	0	0	2	2	1
8	Programme corecourse-8	CAPC-308	C Programming Lab	0	0	2	2	1
9	Programme corecourse-9	CEPC-309	Geotechnical Engineering Lab.	0	0	2	2	1
10	Summer Internship-I (3 to 4 weeks)after IInd Semester	CESI-310	Summer Internship-I	0	0	0	0	2
			Total				**22**	**20**

Building Materials and Construction

Course Code	CEPC-301
Course Title	Building Materials and construction
Number of Credits	3 (L: 3, T: 0, P:0)
Prerequisites	NIL
Course Category	PC

Course Outcomes: -Upon completion of the course the students will be able to:

- Identify relevant construction materials. **(K2)**
- Identify relevant natural artificial construction materials. **(K2)**
- Select relevant special and processed type of construction materials. **(K3)**
- Identify components of building structures. **(K2)**
- Propose suitable type of foundation and suitable type of masonry forbuilding structures. **(K3)**

Course Content:-

Module- 1: Overview of Construction Materials

Number of class hours: 6-8 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Describe the scope of construction materials
2) Select materials for different civil engineering structures
3) Broadly classify building construction materials.

Detailed content of the unit: -

- Scope of construction materials in Building Construction, Transportation Engineering, Environmental Engineering, Irrigation Engineering (applications only).
- Selection of materials for different civil engineering structures on the basis of strength, durability, Eco friendly and economy.
- Broad classification of materials –Natural, Artificial, special, finishing and recycled.

Module- 2: Natural and Artificial Construction Materials

Number of class hours: 8-10 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Explain utilization of stone, timber, asphalt and bitumen etc.
2) Describe soil suitability, use of bricks and flooring tiles.
3) Illustrate manufacturing process of cement.

Detailed content of the unit: -

- Requirements of good building stone; general characteristics of stone; quarrying and dressing methods and tools for stone.
- Structure of timber, general properties and uses of good timber,

different methods of seasoning for preservation of timber, defects in timber, use of bamboo in construction.

- Asphalt, bitumen and tar used in construction, properties and uses, Properties of lime, its types and uses.
- Types of soil and its suitability in construction, Properties of sand and uses, Classification of coarse aggregate according to size.
- Constituents of brick earth, Conventional / Traditional bricks, Modular and Standard bricks, Special bricks –fly ash bricks, Characteristics of good brick, Field tests on Bricks, Classification of burnt clay bricks and their suitability, Manufacturing process of burnt clay brick, fly ash bricks, Aerated concrete blocks.
- Flooring tiles – Types, uses
- Manufacturing process of Cement- dry and wet (only flowchart), types of cement and its uses. Field testson cement.

Module-3: Special and Processed Construction Materials

Number of class hours: 6-8 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Explain suitability of Water proofing, Termite proofing; Thermal and sound insulating materials.
2) Describe fibers, Geopolymer cement and Plaster of Paris
3) Explain Industrial and Agro waste materials, Special processed construction materials

Detailed content of the unit: -

- Types of material and suitability in construction works of following materials: Water proofing, Termite proofing; Thermal and sound insulating materials.
- Fibers – Types –Jute, Glass, Plastic Asbestos Fibers, (only uses).
- Geopolymer cement: Geo-cement: properties, uses.
- Constituents and uses of POP (Plaster of Paris), POP finishing boards, sizes and uses.
- Industrial waste materials- Fly ash, Blast furnace slag, Granite and marble polishing waste and their uses.
- Agro waste materials - Rice husk, Bagasse, coir fibres and their uses.
- Special processed construction materials; Geo- synthetic, Ferro Crete, Artificial timber, Artificial sand and their uses.

Module-4: Overview of Building Components

Number of class hours: 7-9 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Classify buildings as per NBC
2) Explain different building components
3) Describe Superstructure

Detailed content of the unit:

- Classification of Buildings as per National Building Code Group A to I, as per Types of Constructions- Load Bearing Structure, Framed Structure,Composite Structure.

- Building Components - Functions of Building Components, Substructure – Foundation, Plinth.
- Superstructure– Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, floor, Mezzaninefloor, Roof, Columns, Beams, Parapet

Module- 5: Construction of Substructure and superstructure

Number of class hours: 7-9 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Identify proper job layout
2) Describe earthwork, different foundation types.
3) Explain use of Stone and brick masonry.
4) Illustrate Scaffolding and Shoring

Detailed content of the unit: -

- Job Layout: Site Clearance, Layout for Load Bearing Structure and Framed Structure by Center Line and Face Line Method, Precautions.
- Earthwork: Excavation for Foundation, Timbering and Strutting, Earthwork for embankment, Material for plinth Filling, Tools and plants used for earthwork.
- Foundation: Functions of foundation, Types of foundation, Pumping Methods of Dewatering, Deep wells, Well points, Cofferdams (Introduction only).

- **Stone Masonry:** Terms used in stone masonry- facing, backing, hearting, through stone, corner stone, cornice. Types of stonemasonry, Joints in stone masonry and their purpose. Selection of Stone Masonry, Precautions to be taken in Stone Masonry Construction.
- **Brick masonry:** Terms used in brick masonry- header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb. Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry.

- **Scaffolding and Shoring:** Purpose, Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork.

<u>References:</u> -

1. Ghose, D. N., Construction Materials, Tata McGraw Hill, NewDelhi.
2. Varghese, P.C., Building Materials, PHI learning, NewDelhi.
3. Rajput, R.K, Engineering Materials, S. Chand and Co., NewDelhi.
4. Sood H., Laboratory Manual on Testing of Engineering Materials, NewAge Publishers, New Delhi.
5. Duggal, S. K, Building Materials, New International, NewDelhi.

6. Sushil Kumar., Building Construction, Standard Publication.
7. Rangawala, S. C., Building Construction, Charotar Publication, Anand.
8. Punmia B. C., and Jain A. K., Building Construction, Fire wall Media.
9. Francis and D.C. Ching, Building Construction Illustrated, Wiley, 6th Edition

SURVEYING

Course Code	CEPC-302
Course Title	Surveying
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	Programme core course-2

Course Outcomes: -

After completing this course, student will be able to:

1) Select the type of survey required for given situation. (K1)
2) Compute area of open field using chain, tape and cross staff and Conduct traversing in the field using chain and compass. (K3)
3) Use levelling instruments to determine reduced level for preparation of contour maps and Use digital planimeter to calculate the areas. (K3)
4) Prepare plans using Plane Table Surveys, Compute horizontal angle and vertical angle using Theodolite and illustrate the use of Total Station. (K3)
5) Solve problems related to simple curve and Compute constants of tacheometer, horizontal and vertical distances. (K3)
6) Find distances and elevations using Tachometer and Locate coordinates of stations and discuss the use and functions of GPS and GIS. (K2)

Course Content:

Module – 1: Overview, Classification of Survey and Chain Surveying

Number of class hours: 6-8 hours

Suggestive Learning Outcomes:

At the end of module -1, students will be able to:-

1. Know the purpose and use of different types of survey. (K1)
2. Classify the types of survey. (K2)
3. Explain the Principles of Surveying. (K2)
4. Know the various terms related to chain surveying. (K1)
5. Conduct ranging. (K3)
6. Explain the Principles of Chain Surveying. (K2)

Detailed content of the unit: -

• Survey- Purpose and Use.
• Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydrographic, Photogrammetry and Aerial.
• Principles of Surveying.
• Scales: Engineer's scale, Representative Fraction (RF) and diagonal scale.
• Instruments used in chain survey: Metric Chain, Tapes, Arrow, Ranging rod, Line ranger, offset rod, Open cross staff, Optical square.
• Chain survey Station, Base line, Check line, Tie line, Offset, Tie station.
• Ranging: Direct and Indirect Ranging.
• Methods of Chaining, obstacles in chaining.

• Errors in length: Instrumental error, personal error, error due to natural cause, random error.
• Principles of triangulation.
• Types of offsets: Perpendicular and Oblique.
• Conventional Signs, Recording of measurements in a field book.

Module-2: Compass Traverse Survey and Plane Table Surveying
Number of class hours: 8-10 hours

Suggestive Learning Outcomes:
At the end of module -2, students will be able to:-

1. Know the various technical terms related to compass surveying. (K1)
2. Conduct traversing using Prismatic compass and Solve problems related to localattraction (K3)
3. Explain principles of plane table surveying and various methods of plane table surveying (K2)
4. Prepare plans using various methods of plane table surveying. (K3)

Detailed content of the unit: -
• Compass Traversing- open, closed.
• Technical Terms: Geographic/ True Magnetic Meridians and Bearings, Whole Circle Bearing system and Reduced Bearing system and examples on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing, Calculation of internal and external angles from bearings at a station, Dip of Magnetic needle, Magnetic Declination.
• Components of Prismatic Compass and their Functions, Methods of using Prismatic Compass- Temporary adjustments and observing bearings.
• Local attraction, Methods of correction of observed bearings - Correction at station and correction to included angles.
• Methods of plotting a traverse and closing error, Graphical adjustment of closing error.
• Principles of plane table survey.
• Accessories of plane table and their use, Telescopic alidade.
• Setting of plane table; Orientation of plane table - Back sighting and Magnetic meridian method, True Meridian Method.
• Methods of plane table surveys- Radiation, Intersection and Traversing.
• Merits and demerits of plane table survey.

Module-3: Levelling and Contouring
Number of class hours: 7-9 hours

Suggestive Learning Outcomes:
At the end of module -3, students will be able to:-

1. Know the various terminologies related to levelling and contouring. (K1)
2. Solve problems of reduced level by different methods. (K3)
3. Prepare contour maps. (K3)

Detailed content of the unit: -

• Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments.
• Types of levels: Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its fundamental axes, Temporary adjustments of Level.
• Types of Leveling Staff: Self-reading staff and Target staff.
• Reduction of level by Line of collimation and Rise and Fall Method.
• Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling.
• Contour, contour intervals, horizontal equivalent.
• Uses of contour maps, Characteristics of contours, Methods of Contouring: Direct and indirect.

Module-4: Theodolite Surveying, Tacheometric surveying and Curve setting
Number of class hours: 10 hours

Suggestive Learning Outcomes:
At the end of module -4, students will be able to:-

1. Know components and the functions of transit theodolite. (K1)
2. Compute horizontal angle and vertical angle using Theodolite. (K3)
3. Perform theodolite traversing. (K3)
4. Know components and terminology related to Tacheometric surveying and curve setting. (K1)
5. Compute constants of tacheometer, horizontal and vertical distances. (K3)
6. Solve problems related to simple curve by offsets from long chord and Rankine's method. (K3)

Detailed content of the unit: -

• Types and uses of Theodolite, Components of transit Theodolite and their functions, Reading the Vernier of transit Theodolite.
• Technical terms- Swinging, Transiting, Face left, Face right.
• Fundamental axes of transit Theodolite and their relationship
• Temporary adjustment of transit Theodolite.
• Measurement of horizontal angle- Direct and Repetition method, Errors eliminated by method of repetition.

• Measurement of magnetic bearing of a line, Prolonging and ranging a line, deflection angle.
• Measurement of vertical angle.
• Theodolite traversing by Included angle method and Deflection angle method.
• Checks for open and closed traverse, Calculations of bearing from angles.
• Traverse computation-Latitude, Departure, Consecutive coordinates, Independent coordinates, balancing the traverse by Bowditch's rule and Transit rule, Gale's Traverse table computation.
• Principles of Tacheometry, Tacheometer and its component parts, Anallatic lens.
• Tacheometric formula for horizontal distance with telescope horizontal and staff vertical.
• Field method for determining constants of tacheometer, Determining horizontal and vertical distances with tacheometer by fixed hair method and staff held vertical, Limitations of tacheometry.
• Types of curves used in roads and railway alignments. Designation of curves.
• Setting simple circular curve by offsets from long chord and Rankine's method of deflection angles.

Module-5: Measurement of Area and Volume, Advanced surveying equipment and Remote sensing, GPS and GIS

Number of class hours: 8-10 hours

Suggestive Learning Outcomes:
At the end of module -5, students will be able to:-

1. Know the various components of digital planimeter and define drone surveying. (K1)
2. Use digital planimeter to calculate the areas and volume of reservoir (K3)
3. Know the principle, components and functions related to EDM. (K1)
4. Illustrate the use and functions of Total Station and Compute distances and coordinates using Total Station (K3)
5. Discuss the applications of remote sensing. (K2)
6. Discuss the use and functions of GPS and GIS. (K2)

Detailed content of the unit: -
• Components and use of Digital planimeter.
• Measurement of area using digital planimeter.
• Measurement of volume of reservoir from contour map.
• Principle of Electronic Distance Meter (EDM), its component parts and their Functions, use of EDM.
• Use of micro optic Theodolite and Electronic Digital Theodolite.
• Use of Total Station, Use of function keys.
• Measurements of Horizontal angles, vertical angles, distances and coordinates using Total Station, Traversing, Profile Survey and Contouring with Total Station.
• Remote Sensing – Overview, Remote sensing system, Applications of remote sensing in Civil Engineering, land use / Land cover, mapping, disaster management.
• Use of Global Positioning System (G.P.S.) instruments.

• Geographic Information System (GIS): Over view, Components, Applications, Software for GIS.
• Introduction to Drone Surveying.

References: -

1. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying Vol. I and Surveying Vol. II,
Laxmi Publications Pvt. Ltd., New Delhi.
2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling Part I and II, Pune Vidyarthi Gruh Prakashan, Pune.
4. Duggal, S. K., Survey I and Survey II, Tata McGraw Hill Education Pvt. Ltd., Noida.
5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.
6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Delhi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning New Delhi.
8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.
9. Arora K R , Surveying Vol. I, Standard Book House
10. Venkatramaiah, C, Textbook of Surveying, Universities Press, Hyderabad.
11. Anderson, James M and Mikhail, Edward M, Surveying theory and practice, Mc Graw Hill Education, Noida.
12. De, Alak, Plane Surveying, S.Chand Publications, New Delhi.

CONCRETE TECHNOLOGY

Course Code	:	CEPC-303
Course Title	:	Concrete Technology
Number of Credits	:	2 (L: 2, T: 0, P: 0)
Prerequisites	:	NIL
Course Category	:	PC

Course outcomes:

After completing this course, student will be able to:

CO 1. Use different types of cement and aggregates in concrete(K3)

CO 2. Prepare concrete of desired compressive strength. (K3)

CO 3. Prepare concrete of required specification. (K3)

CO 4. Categorize the quality of concrete under different conditions. (K4)

CO 5. Apply relevant admixtures for concreting. (K3)

Detailed Course Content

Module – 1 Cement, Aggregates and Water

Number of Class hours: 08-10

Learning Outcomes:

1. Identify the Physical properties of OPC and PPC. Different grades of OPC and relevant BIS codes. (K1)
2. Discuss the Testing of cement: Laboratory tests-fineness, standard consistency, settingtime, soundness, compressive strength. Storage of cement and effect of storage on properties of cement (K2).
3. Discuss the BIS Specifications and field applications of different types of cements (K2).
4. Identify the Aggregates: Requirements of good aggregate, Classification according to size and shape. (K1)
5. Discover the Fine aggregates as per IS383(1970). Concept of crushed Sand. (K3)
6. Identify the Coarse aggregates and abrasion value of coarse aggregates with specifications. (K1)
7. Discuss the Water: Quality of water, impurities in mixing water and permissible limits for solids as per IS:456(1970). (K2)

Detailed content of the unit:

Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength. Different grades of OPC and relevant BIS codes

Testing of cement: Laboratory tests-fineness, standard consistency, setting time, soundness, compressive strength. Storage of cement and effect of storage on properties of cement.

BIS Specifications and field applications of different types of cements: Rapid hardening, Low heat, Portland pozzolana, Sulphate resisting, Blast furnace slag, High Alumina and White cement.
Aggregates: Requirements of good aggregate, Classification according to size and shape.
Fine aggregates: Properties, size, specific gravity, bulk density, water absorption and bulking, fineness modulus and grading zone of sand, silt content and the it specification as per IS:383(1970) Concept of crushed sand.
Coarse aggregates: Properties, size, shape, surface texture, water absorption, soundness, specific gravity and bulk density, fineness modulus of coarse aggregate, grading of coarse aggregates, crushing value, impact value and abrasion value of coarse aggregates with specifications.
Water: Quality of water, impurities in mixing water and permissible limits for solids as per IS: 456(2000).

Module– 2 Concrete

Number of Class hours: 8-10

Learning Outcomes:

Discuss the Concrete: Different grades of concrete, provisions of IS:456(2000)(K2)

1. Discover all about the Duff Abraham water cement (w/c) ratio law(K3)
2. Identify the Properties of fresh concrete: Workability: Factors affecting workability of concrete (k1)
3. Identify the Properties of Hardened concrete: Strength, Durability, Impermeability. (K1)

Detailed content of the unit:

Concrete: Different grades of concrete, provisions of IS:456(2000).
Duff Abraham water cement (w/c) ratio law, significance of w/c ratio, selection of w/c ratio for different grades, maximum w/c ratio for different grades of concrete for different exposure conditions as per IS456(2000).
Properties of fresh concrete: Workability: Factors affecting workability of concrete. Determination of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer.
Value of workability requirement for different types of concrete works. Segregation, bleeding and preventive measures.
Properties of Hardened concrete: Strength, Durability, Impermeability.

Module– 3 Concrete Mix Design and Testing of Concrete

Number of Class hours: 08-10

Learning Outcomes:

1. Discuss the Concrete mix design(K2)
2. Identify the methods of Testing of concrete, determination of compressive strength(K1)
3. Discover the Non- destructive testing of concrete, Importance of NDT tests(K3)

Detailed content of the unit:

Concrete mix design: Objectives, methods of mix design, study of mix design as per IS10262
(only procedural steps).

Testing of concrete, determination of compressive strength of concrete cubes at different ages, interpretation and co-relation of test results.
Non- destructive testing of concrete: Rebound hammer test, working principle of rebound hammer and factor affecting there bound index,
Ultra sonic pulse velocity test as per IS 13311 (part 1 and 2) (1992)

Importance of NDT tests.

Module– 4 Quality Control of Concrete

Number of Class hours: 06-08

Learning Outcomes:

1. Discuss the Concreting Operations (K2)
2. Discover the Forms for concreting (K3)
3. Identify the Waterproofing: Importance and need (K1)
4. Analyze the Joints in concrete construction (K4)

Detailed content of the unit:

Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete.
Forms for concreting: Different types of formworks for beams, slabs, columns, materials used for formwork, requirement of good formwork.
Stripping time for removal of formwork as per IS456(2000).

Waterproofing: Importance and need of waterproofing, methods of waterproofing and materials used for waterproofing.

Joints in concrete construction: Types of joints, methods for joining old and new concrete, materials used for filling joints.

Module– 5 Chemical Admixture, Special Concrete and Extreme Weather concreting

Number of Class hours: 06-08

Learning Outcomes:

1. Identify all about the Admixtures in concrete(K1)
2. Discover all about Special Concrete and its properties(K3)
3. Discuss all about the Cold weather concreting and its effects (K2)
4. Discuss all about Hot weather concreting and its effects (K2)

Detailed content of the unit:

Admixtures in concrete: Purpose, properties and application for different types of admixtures such as accelerating admixtures, retarding admixtures, water reducing admixtures, airentraining admixtures and super plasticizers.

Special Concrete: Properties, advantages and limitation of following types of Special concrete: Ready mix Concrete, Fiber Reinforced Concrete, High performance Concrete Self- compacting concrete and light weight concrete.

Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition.

Hot weather concreting: effect of hot weather on concrete, precautions to be taken while œncreting in hot weather condition.

Suggested learning resources:

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd.,Delhi.
2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
3. Santhakumar, A. R., Concrete Technology, Oxford University Press, NewDelhi.
4. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt.Ltd.
5. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., NewDelhi.
6. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New Delhi.

MECHANICS OF SOLIDS

Course Code	:	CEPC-304
Course Title	:	Mechanics of Solids
Number of Credits	:	3 (L: 3, T: 0, P:0)
Prerequisites	:	NIL
Course Category	:	PC

Course outcomes:

After competing this course, student will be able to:

CO 1. Apply the knowledge structural behavior of materials under variousloading conditions (K3).

CO 2.
Drawshearforceandbendingmomentdiagramsforvarioustypesofbeamsandloading conditions (K3).

CO 3. Determine the bending and shear stresses in beams under differentloading conditions(K5).

CO 4. Identify various loading and end conditions for column (K3).

CO 5. Analyze statically determinate and indeterminate structures (K5)

Detailed Course Content

Module – 1: Simple Stresses and Strains

Number of Class hours: 08-10

Learning Outcomes:

1. Define the concepts of rigid, elastic and plastic bodies, stress, strain, elasticity, Hook's law, Elastic limit, Modulus of elasticity. (K1)
2. Classify Normal, Direct, Bending and Shear and nature of stresses. (K2)
3. Compute Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, Biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus (K3)

Detailed content of the unit:

Definition of rigid, elastic and plastic bodies, deformation of elastic body under various forces, Definition of stress, strain, elasticity, Hook's law, Elastic limit, Modulus of elasticity.

Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e. Tensile and Compressive stresses.
Standard stress strain curve for tor steel bar under tension, Yield stress, Proof stress, Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety.

Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading.

Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, Biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus (Introduction only).

Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation).

Module – 2: Shear Force and Bending Moment

Number of Class hours: 08-10

Learning Outcomes:

1. Identify different types of supports, beams and loads. (K1)
2. Explain Relation between load, shear force and bending moment. (K2)
3. Draw Shear force and bending moment diagram for cantilever and simply supported beams. (K3)

Detailed content of the unit:

Types of supports, beams and loads.

Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment (without derivation).

Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.

Module – 3: Bending and Shear Stresses in beams and Theory of Columns

Number of Class hours: 10-12

Learning Outcomes:

1. Discuss concept and theory of pure bending, assumptions, flexural equation, bending stresses and their nature, bending stress distribution diagram (K2)
2. Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram. (K2)
3. Predict buckling load by Eu-ler's equation and crippling load by Rankine' s formula. (K3)

Detailed content of the unit:

Concept and theory of pure bending, assumptions, flexural equation (without derivation), bending stresses and their nature, bending stress distribution diagram.

Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram.

Concept of compression member, short and long column, Effective length, Radius of gy-ration, Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns.

Euler's theory, assumptions made in Euler's theory and its limitations, Application of Eu- ler's equation to calculate buckling load.

Rankine' s formula and its application to calculate crippling load.

Module – 4: Analysis of Statically Determinate Pin Jointed Structures

Number of Class hours: 06-08

Learning Outcomes:

1. Describe the assumptions made in finding the forces in the members of a Truss. (K1)
2. Calculate forces in the members of a Truss by method of joints and method of section. (K5)

Detailed content of the unit:

Assumptions made in finding the forces in the members of a Truss.

Different methods of finding the forces in the members of a Truss – cantilever and simply supported, subjected to loading by: (a) method of joints, (b) method of sections.

Module– 5: Analysis of Statically Indeterminate Structures

Number of Class hours: 08-10

Learning Outcomes:

1. Analyze Fixed beams under different loading conditions. (K5)
2. Analyze Propped Cantilever under different loading conditions.(K5)
3. Analyze Continuous beams under different loading conditions by Theorem of Three Moments and Slope deflection method. (K5)

Detailed content of the unit:

FIXED BEAMS: Shear Force and Bending Moment diagrams for – (a) uniformly distributed load over whole span, and, (b) point load at any intermediate point within the span.

PROPPED CANTILEVER**:** Shear Force and Bending Moment diagrams for –

(a) Uniformly distributed load (partly and fully throughout the span), and,
(b) Point load at any intermediate position in the span.

TWO SPAN CONTINUOUS BEAMS**:** Shear Force and Bending Momentdiagrams for two equal spans carrying – (a) uniformly distributed load over whole span, and, (b) equal point load at center of each span; using Clapeyron's Theorem of Three Moments and Slope deflection method.

Suggested learning resources:

1. Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. NewDelhi..
2. Rattan S.S., Strength of Materials, McGraw Hill Education; NewDelhi.
3. Bansal R K, Strength of Materials, LaxmiPublications.
4. Subramaniam R, Strength of Materials, Oxford UniversityPress.
5. Structural Analysis(Vol.1), S S Bhavikatti Vikas Publishing House
6. Structural Analysis, R.C Hibbeler , Pearson

7. https://nptel.ac.in/courses/105/105/105105166/
8. https://nptel.ac.in/courses/105/105/105105108/

GEOTECHNICAL ENGINEERING

Course Code	CEPC-305
Course Title	Geotechnical Engineering
Number of Credits	3 (L: 2, T: 1, P: 0)
Prerequisites	NIL
Course Category	PC

Course Outcomes: -

After completing this course, student will be able to:

1) Identify types of rocks and sub soil strata of earth. (K1)
2) Interpret the physical properties of soil related to given construction activities.(K3)
3) Use the results of permeability and shear strength test for foundation analysis.(K3)
4) Interpret soil bearing capacity results. (K3)
5) Compute optimum values for moisture content for maximum dry density of soilthrough various tests. (K3)

Course Content:

Module – 1: Overview of Geology and Geotechnical Engineering

Number of class hours: 8 hours

Suggestive Learning Outcomes:

At the end of module -1, students will be able to:-

1. Identify types of rocks and sub soil strata of earth. (K1)
2. Know the Importance of soil as construction material. (K1)
3. Know about the field application of geotechnical engineering. (K1)

Detailed content of the unit: -

• Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth, Definition of a rock: Classification based on their genesis (mode of origin), formation. Classification and engineering uses of igneous, sedimentary and metamorphic rocks.

• Importance of soil as construction material in Civil engineering structures and as foundation bed for structures.

• Field application of geotechnical engineering for foundation design, pavement design, and design of earth retaining structures, design of earthen dam.

Module– 2: Physical and Index Properties of Soil

Number of class hours: 8 hours

Suggestive Learning Outcomes:

At the end of module -2, students will be able to:-

1. Know Soil in a three-phase system. (K1)
2. Define various important terminology related to soil. (K1)
3. Interpret the physical properties of soil. (K3)

Detailed content of the unit: -

• Soil as a three-phase system, water content, determination of water content by oven drying method as per BIS code, void ratio, porosity and degree of saturation, density index. Unit weightof soil

mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight. Determination of bulk unit weight and dry unit weight by core cutter and sand replacement method, Determination of specific gravity by pycnometer.

• Consistency of soil, Atterberg limits of consistency: Liquid limit, plastic limit and shrinkage limit. Plasticity index.

• Particle size distribution test and plotting of curve, Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil.

Module-3: Permeability and Shear Strength of Soil

Number of class hours: 8 hours

Suggestive Learning Outcomes:

At the end of module -3, students will be able to:-

1. Define permeability, seepage and shear strength. (K1)
2. Solve simple problems related to permeability. (K3)
3. Illustrate about shear strength of soil and its components. (K3)

Detailed content of the unit: -

• Definition of permeability, Darcy's law of permeability, coefficient of permeability, factors affecting permeability, determination of coefficient of permeability by constant head and falling head tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines, application of flow net, (No numerical problems).

• Shear failure of soil, concept of shear strength of soil. Components of shearing resistance of soil – cohesion, internal friction. Mohr-Coulomb failure theory, Strength envelope, strength equation for purely cohesive and cohesion less soils. Direct shear and vane shear test –laboratory methods.

Module-4: Bearing Capacity of Soil

Number of class hours: 8 hours

Suggestive Learning Outcomes:

At the end of module -4, students will be able to:-

1. Define bearing capacity of soil and earth pressure. (K1)
2. Explain the effect of water table on bearing capacity. (K2)
3. Illustrate and solve simple problems related to bearing capacity and earthpressure. (K3)

Detailed content of the unit: -

• Bearing capacity and theory of earth pressure. Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. Introduction to Terzaghi's analysis and assumptions, effect of water table on bearing capacity.

• Field methods for determination of bearing capacity – Plate load and Standard Penetration Test. Test procedures as per IS:1888(1982) & IS:2131(1981).

• Definition of earth pressure, Active and Passive earth pressure for no surcharge condition, coefficient of earth pressure, Rankine's theory and assumptions made for non-cohesive Soils.

Module-5: Compaction and stabilization of soil

Number of class hours: 8 hours

Suggestive Learning Outcomes:

At the end of module -5, students will be able to:-

1. Know the concept of compaction and various factors affecting compaction. (K1)
2. Discuss about the concept and various methods of soil stabilization. (K2)

3. Compute optimum values for moisture content for maximum dry density of soil through various tests. (K3)

Detailed content of the unit: -

• Concept of compaction, Standard and Modified proctor test as per IS code, Plotting of Compaction curve for determining: Optimum moisture content (OMC), maximum dry density (MDD), Zero air voids line. Factors affecting compaction, field methods of compaction – rolling, ramming and vibration. Suitability of various compaction equipment-smooth wheel roller, sheep foot roller, pneumatic tyred roller, Rammer and Vibrator, Difference between compaction and consolidation.

• Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabilization. California bearing ratio (CBR) test - Meaning and Utilization in Pavement Construction

• Necessity of site investigation and soil exploration: Types of exploration, criteria for deciding the location and number of test pits and bores. Field identification of soil – dry strength test, dilatancy test and toughness test.

References: -

1. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication, Delhi.
2. Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Ramamurthy, T.N. & Sitharam,T.G., Geotechnical Engineering(Soil Mechanics), S Chand and Company LTD., New Delhi.
4. Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India, NewDelhi.
5. Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.
6. Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher.
7. Robert D.Holtz, Willian D Kovacs and Thomas C. Sheahan, An Introduction to Geotechnical Engineering, Pearson.

CONSTRUCTION MATERIALS & MECHANICS OF MATERIALS LAB.

Course Code	:	CEPC-306
Course Title	:	Construction Materials & Mechanics of Materials Lab.
Number of Credits	:	1 (L: 0, T: 0, P: 2)
Prerequisites	:	NIL
Course Category	:	PC

Course outcomes:

After completing this course, student will be able to:

- Test different Civil engineering materials on Universal Testing Machine.
- Analyze structural behavior of materials under various loading conditions.
- Interpret shear force and bending moment diagrams for various types of beam sections and different loading conditions.
- Determine bending and shear stresses in beams under different loading conditions.
- Calculate flexural strength of different types of floor tiles.

List of Practicals to be performed:

- Study and understand the use and components of Universal Testing Machine (UTM).
- Perform Tension test on mild steel as per IS: 432(1) 1982.
- Perform tension test on Tor steel as per IS: 1608, IS:1139-1959.
- Conduct compression test on sample test piece using Compression Testing Machine.
- Conduct Izod Impact test on three metals. e.g. mild steel/ brass/aluminum/ copper /cast iron etc as perIS:1598(1977).
- ConductCharpyImpacttestonthreemetals.e.g.mildsteel/brass/aluminium /copper/cast iron etc as per IS: 1757(1988).
- Determine Water Absorption on bricks per IS: 3495 (part II) 1992, IS:1077(1992) ortile IS:1237(1988).
- Determine Compressive strength of dry and wet bricks as per IS: 3495 (partI) 1992, IS:1077(1992).
- Conduct Abrasion Test on flooring tiles (anyone)e.g., Mosaic tiles, Ceramic Tiles as per IS: 13630 (part7)(2006), Cement Tile as per IS: 1237 (2012).
- Perform Single Shear and double shear test on any two metals e.g.,Mild steel/ brass/aluminum/copper / cast iron etc as perIS:5242 (1979).
- Conduct Compression test on timber section along the grain and across the grain as per IS:2408(1963).
- Plot Shear force and Bending Moment diagrams for cantilever, simply supported beams.
- Mix design

- Plot Shear force and Bending Moment diagrams for overhanging beams for different types of loads including moment loading.

- Conduct Flexural test on timber beam on rectangular section in both orientations as per IS:1708(1986), IS:2408(1963).
- Conduct Flexure test on floor tiles IS:1237(2012), IS:13630(2006) or roofing tiles asperIS:654(1992), IS:2690(1993).

Suggested learning resources:

1. Bedi D.S., Strength of Materials, Khanna Publishing House, New Delhi (Edition2018)
2. Timoshenko, S., Strength of Materials, Vol. I, CBS, New Delhi.
3. Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. NewDelhi.
4. Ramamurtham, S, Strength of Materials, Dhanpat Rai and sons, NewDelhi.
5. Punmia B C, Strength of Materials, Laxmi Publications (p) Ltd. NewDelhi.
6. Rattan S.S., Strength of Materials, McGraw Hill Education; NewDelhi.
7. Bansal R K, Strength of Materials, LaxmiPublications.
8. Subramaniam R, Strength of Materials, Oxford UniversityPress.
9. Andrew Pytel and Ferdinand L Singer, Strength of Materials, Pearson.

SURVEYING LABORATORY

Course Code	CEPC-307
Course Title	Surveying Lab.
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	NIL
Course Category	Programme corecourse-7

Course Outcomes: -

After completing this course, student will be able to:

1) Select the type of survey required for given situation. (K1)
2) Compute area of open field using chain, tape and cross staff and Conduct traversing in the field using chain and compass. (K3)
3) Use levelling instruments to determine reduced level for preparation of contour maps and use digital planimeter to calculate the areas. (K3)
4) Prepare plans using Plane Table Surveys, Compute horizontal angle and vertical angle using Theodolite and illustrate the use of Total Station. (K3)
5) Solve problems related to simple curve and Compute constants of tacheometer, horizontal and vertical distances. (K3)
6) Find distances and elevations using Tachometer and Locate coordinates of stations and discuss the use and functions of GPS and GIS. (K2)

List of Practicals to be performed

1	Measure distance between two survey stations using chain, tape and ranging rods when two stations are inter visible.
2	Undertake reciprocal ranging and measure the distance between two stations.
3	Determine area of open field using chain and cross staff survey.
4	Measure Fore Bearing and Back Bearing of survey lines of open traverse and closed traverse of 5 or 6 sides using Prismatic Compass and correct the bearings and includedangles for the local attraction.
5	Undertake Survey Project with chain and compass for closed traverse for minimum 5 sides around a building and Plot the traverse on A1 size imperial drawing sheet for data collected.
6	Undertake simple leveling using dumpy level/ Auto level and leveling staff.
7	Undertake differential leveling and determine Reduced Levels by Height of instrument method and Rise and fall method using dumpy level/Auto Level and leveling staff.
8	Undertake fly leveling with double check using dumpy level/ Auto level and leveling staff
9	Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning for a road length of 500 m with cross-section at 30 m interval.
10	Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning for a road length of 500 m with cross-section at 30 m interval.
11	Undertake Survey Project for plotting contour map using block contouring method for a block of 150m x 150m with grid of 10m x 10m
12	Measure area of irregular figure using Digital planimeter.
13	Use plane table survey to prepare plans of a plot of seven sided closed traverse by Radiation Method, Intersection Method and Traversing Method.
14	Use plane table survey to carry out Survey Project for closed traverse for minimum fivesides around a building.
15	Use transit theodolite to measure Horizontal and Vertical angle by Direct Method and Plot the traverse on A1 size imperial drawing sheet for the collected data.

16	Use Thedolite as a Tacheometer to compute reduced levels and horizontal distances.
17	Set out a circular curve by Rankine's Method of Deflection Angles.
18	Use micro optic Theodolite to Measure Horizontal angle by Direct Method.
19	Use EDM to measure horizontal distance.
20	Use Total station instrument to measure horizontal distances and vertical angle.
21	Use Total station instrument to carry out Survey Project for closed traverse for minimum five sides and Plot the traverse on A1 size imperial drawing sheet for the collected data.
22	Use GPS to locate the coordinates of a station.

References: -

1. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying Vol. I and Surveying Vol. II, Laxmi Publications Pvt. Ltd., New Delhi.
2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling Part I and II, Pune Vidyarthi Gruh Prakashan, Pune.
4. Duggal, S. K., Survey I and Survey II, Tata McGraw Hill Education Pvt. Ltd., Noida.
5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.
6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Delhi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning New Delhi.
8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.
9. Arora K R , Surveying Vol. I, Standard Book House
10. Venkatramaiah, C, Textbook of Surveying, Universities Press, Hyderabad.
11. Anderson, James M and Mikhail, Edward M, Surveying theory and practice, Mc Graw Hill Education, Noida.
12. De, Alak, Plane Surveying, S.Chand Publications, New Delhi.

C Programming Lab

Course Code	:	CAPC-308
Course Title	:	C Programming Lab
Number of Credits	:	1 (L: 0, T: 0, P: 2)
Prerequisites	:	NIL
Course Category	:	PC

Course outcomes:

After completing this course, student will be able to:

- Use the fundamentals of C programming in trivial problem solving
- Enhance skill on problem solving by constructing algorithms
- Apply skill of identifying appropriate programming constructs for problem

List of Practical to be performed:

1	Introduction of Programming Languages
2	'C' Tokens
3	Control Statement and Expressions
4	Looping
5	Arrays and String
6	Functions
7	Pointers and Inheritance

Suggested learning resources:

- Brain W. Kernighan, The C Programming Language, 2nd Edition
- Greg Perry and Dean Miller, C Programming Absolute Beginner's Guide.
- Yashavant Kanetkar, Authentic Guide to C Programming Language, BPB Publications; 18th Edition

GEOTECHNICAL ENGINEERING LABORATORY

Course Code	CEPC-309
Course Title	Geotechnical Engineering Lab.
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	NIL
Course Category	Programme corecourse-9

Course Outcomes: -

After completing this course, student will be able to:

1) Identify types of rocks and sub soil strata of earth. (K1)
2) Interpret the physical properties of soil related to given construction activities. (K3)
3) Use the results of permeability and shear strength test for foundation analysis. (K3)
4) Interpret soil bearing capacity results. (K3)
5) Compute optimum values for moisture content for maximum dry density of soil through various tests. (K3)

List of Practicals to be performed

1	Identification of rocks from the given specimen
2	Determine water content of given soil sample by oven drying method as per IS: 2720 (Part-II), 1973.
3	Determine specific gravity of soil by pycnometer method as per IS 2720 (Part- III), 1980.
4	Determine dry unit weight of soil in field by core cutter method as per IS 2720 (Part-XXIX), 1992.
5	Determine dry unit weight of soil in field by sand replacement method as per IS 2720 (Part-XXVIII), 1992.
6	Determine Plastic and Liquid Limit along with Plasticity Index of given soil sample as per IS 2720 (Part- V), 1992.
7	Determine Shrinkage limit of given soil sample as per IS 2720 (Part- V), 1985.
8	Determine grain size distribution of given soil sample by mechanical sieve analysis as per IS 2720 (Part- IV) 1985.
9	Use different types of soil to identify and classify soil by conducting field tests-Through Visual inspection, Dry strength test, Dilatancy test and Toughness test.
10	Determine coefficient of permeability by constant head test as per IS 2720 (Part- XVII), 1986.
11	Determine coefficient of permeability by falling head test as per IS 2720 (Part- XVII), 1986.
12	Determine shear strength of soil by direct shear test as per IS 2720 (Part-XIII), 1986.
13	Determine shear strength of soil by vane shear test as per IS 2720 (Part-XXX), 1980.
14	Determine MDD and OMC by standard proctor test of given soil sample as per IS 2720 (Part-VII), 1980.
15	Determination of CBR value on the field as per IS2720 (Part - XVI), 1987.

References: -

1. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication
2. Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Ramamurthy, T.N. & Sitharam,T.G., Geotechnical Engineering(Soil Mechanics), S Chand and Company LTD., New Delhi.

4. Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India
5. Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.
6. Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher.
7. John t. Germaine and Amy V. Germaine, Geotechnical Laboratory Measurements, John Wilry & sons Inc

Summer Internship-I

Course Code	CESI-310
Course Title	Summer Internship-I
Number of Credits	2 (L: 0, T: 0, P: 0)
Prerequisites	Nil
Course Category	Internship

Internships may be full-time or part-time; they are full-time in the summer vacation and part-time during the academic session.

Sl. no.	Schedule	Duration	Activities	Credits	Hours of Work
1	Summer Vacation after 2nd Semester	3-4 Weeks	Inter/ Intra Institutional Activities **	2	80 Hours

(** Students are required to be involved in Inter/ Intra Institutional Activities viz; Training with higher Institutions; Soft skill training organized by Training and Placement Cell of the respective Institutions; contribution at incubation/ innovation /entrepreneurship cell of the Institute; participation in conferences/ workshops/ competitions etc.; Learning at Departmental Lab/ Tinkering Lab/ Institutional workshop; Working for consultancy/ research project within the Institutes and Participation in all the activities of Institute's Innovation Council for e.g.: IPR workshop/Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc.)

Benefits to Students:

1. An opportunity to get hired by the Industry/ organization.
2. Practical experience in an organizational setting.
3. Excellent opportunity to see how the theoretical aspects learned in classes are integrated into the practical world. On-floor experience provides much more professional experience which is often worth more than classroom teaching.
4. Helps them decide if the industry and the profession is the best career option to pursue.
5. Opportunity to learn new skills and supplement knowledge.
6. Opportunity to practice communication and teamwork skills.
7. Opportunity to learn strategies like time management, multi-tasking etc. in an industrial setup.
8. Opportunity to meet new people and learn networking skills.
9. Makes a valuable addition to their resume.
10. Enhances their candidacy for higher education.
11. Creating network and social circle and developing relationships with industry people.
12. Provides opportunity to evaluate the organization before committing to a full-timeposition.

Course Outcome:-

After completion of the course, students will be able to:

C.O.1: Explain the real life organizational and industrial environment situations (K2).
C.O.2: Develop organizational dynamics in terms of organizational behaviour, culture and professional ethics (K1).
C.O.3: Understand the importance of Team work (K2).
C.O.4: Explain invaluable knowledge and networking experience (K2).
C.O.5: Develop skill to build a relationship with a prospective employer (K3).

Course Content:-

Internships are educational and career development opportunities, providing practical experiencein a field or discipline. The Summer Internship-I is a student centric activity that would expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry. They are structured, short-term, supervised placements often focused around particular tasks or projects with defined timescales. An internship may be compensated, non-compensated or some time may be paid. The internship has to be meaningful and mutually beneficial to the intern and the organization. It is important that the objectives and the activities of the internship program are clearly defined and understood. Following are the intended objectives of internship training:

1. Will expose Technical students to the industrial environment, which cannot be simulated in theclassroom and hence creating competent professionals for the industry.
2. Provide possible opportunities to learn, understand and sharpen the real time technical /managerial skills required at the job.
3. Exposure to the current technological developments relevant to the subject area of training.
4. Experience gained from the 'Industrial Internship' in classroom will be used in classroomdiscussions.
5. Create conditions conducive to quest for knowledge and its applicability on the job.
6. Learn to apply the Technical knowledge in real industrial situations.
7. Gain experience in writing Technical reports/projects.
8. Expose students to the engineer's responsibilities and ethics.
9. Familiarize with various materials, processes, products and their applications along with relevantaspects of quality control.
10. Promote academic, professional and/or personal development.
11. Expose the students to future employers.
12. Understand the social, economic and administrative considerations that influence the workingenvironment of industrial organizations
13. Understand the psychology of the workers and their habits, attitudes and approach to problemsolving.

Overall compilation of Internship Activities / Credit Framework:

Major Head of Activity	Credit	Schedule	Total Duration	Sub Activity Head	Proposed Document as Evidence	Evaluated by	Performance appraisal/ Maximum points/ activity
				Inter/ Intra Institutional Workshop/ Training	Certificate	Programme Head	Satisfactory/ Good/ Excellent

Inter/ Intra Institutional Activities	2	Summer Vacation after 2nd Semester	3-4 Weeks	Working for consultancy/ research project	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Festival (Technical / Business / Others) Events	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Contribution in Incubation/ Innovation/ Entrepreneurship Cell/ Institutional Innovation Council	Certificate	Cell In-charge	Satisfactory/ Good/ Excellent
				Learning at Departmental Lab/Tinkering Lab/ Institutional workshop	Certificate	Cell In-charge	Satisfactory/ Good/ Excellent

STUDENT'S DIARY/ DAILY LOG

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day-to-day accountof the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed at the end of each day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and get ratified on the day of his visit.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

a) Regularity in maintenance of the diary.
b) Adequacy & quality of information recorded.
c) Drawings, sketches and data recorded.
d) Thought process and recording techniques used.
e) Organization of the information.

INTERNSHIP REPORT

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor,TPO and Faculty Mentor. The Internship report will be evaluated on the basis of following criteria:

a) Originality.
b) Adequacy and purposeful write-up.
c) Organization, format, drawings, sketches, style, language etc.
d) Variety and relevance of learning experience.
e) Practical applications, relationships with basic theory and concepts taught in the course.