

**Rationale**

Diploma holders in Civil Engineering are supposed to supervise concreting operations involving proportioning, mixing, transporting, placing, compacting, finishing and curing of concrete. To perform above functions, it is essential to impart knowledge and skills regarding ingredients of concrete and their properties; properties of concrete in plastic and hardened stage, water cement ratio and workability; proportioning for ordinary concrete; concreting operations and joints in concrete.

**Detailed Contents****UNIT I**

Introduction: Definition of concrete, uses of concrete in comparison to other building materials. Ingredients of Concrete: Cement: physical properties of cement; different types of cement as per IS Codes. Aggregates: Classification of aggregates according to size and shape, Characteristics of aggregates: Particle size and shape, texture, specific gravity of aggregate, bulk density, materials, soundness water absorption, surface moisture, bulking of sand, deleterious. Grading of aggregates : coarse aggregate, fine aggregate; All-in- aggregate; fineness modulus; interpretation of grading charts. Water: Quality requirements as per IS: 456-2000, Water Cement Ratio: Hydration of cement, principle of water-cement ratio: Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and effects of w/c on strength of concrete. Workability: Workability factors affecting workability, Measurement of workability: slump test, compacting factor and Vee Bee consistometer ; Recommended slumps for placement in various conditions as per IS:456-2000/SP-23.

**UNIT II**

Properties And Proportioning of Normal Concrete: Properties in plastic state: Workability, Segregation, Bleeding and Harshness, Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes; Proportioning for Normal Concrete: Objectives of mix design, introduction to various grades as per IS:456-2000; proportioning for nominal mix design as prescribed by IS 456-2000. Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability, Difference between nominal and controlled concrete. Introduction to IS-10262-2009-Code for controlled mix design

### **UNIT III**

**Introduction to Admixtures and Some Special Concretes:**(chemicals and minerals) for improving performance of concrete **Special Concretes** (only features).**Concreting under special conditions, difficulties and precautions before, during and after concreting, Cold weather concreting, Under water concreting, Hot weather concreting, Ready mix concrete, Fibre reinforced concrete, Polymer Concrete, Fly ash concrete, Silica fume concrete ,self-compacting concrete.**

### **UNIT IV**

**Concreting Operations: Storing of Cement: Storing of cement in a warehouse, Storing of cement at site, Effect of storage on strength of cement ,Determination of warehouse capacity for storage of Cement Storing of Aggregate: Storing of aggregate at site, Batching (to be shown during site visit ) Batching of Cement: Batching of aggregate by: Volume, using gauge box (farma) selection of proper gauge box Weight spring balances and batching machines, Measurement of water. Mixing: Hand mixing,Machine mixing - types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers Maintenance and care of machines. Transportation of concrete: Transportation of concrete using: wheel barrows, transit mixers, chutes, belt conveyors, pumps, tower crane and hoists etc.,Placement of concrete: Checking of form work, shuttering and precautions to be taken during Placement.Compaction: Hand compaction Machine compaction - types of vibrators, internal screed vibrators and form vibrators Selection of suitable vibrators for different situations. Finishing concrete slabs - screeding, floating and trowelling. Curing: Objectives of curing, methods of curing like ponding, membrane curing, steam curing, chemical curing Duration for curing and removal of form work . Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location.**

### **UNIT V**

**Defects in concrete: Identification of and methods of repair. Importance and methods of non-destructive tests (introduction only)**

**NOTE: A field visit may be planned to explain and show the relevant things**

### **Instructional Strategy**

This subject is of practical nature. While imparting instructions, teachers are expected to organize demonstrations and field visits to show various stages of concreting operations. While working in the laboratory, efforts should be made to provide extensive practical training to students so as to make them

confident in the preparation and testing of concrete. Teachers should also organize viva examination so as to develop understanding about concepts and principles involved. The experiments may be demonstrated to students through video programs developed in the field of „concrete technology“ by NITTTR, Chandigarh.

### **Recommended Books**

- i) Kulkarni, PD; Ghosh, RK and Phull, YR; "Text Book of Concrete Technology"; Oxford and IBH Publishing Co. New Delhi
- ii) Krishnamurthy, KT; Rao, A Kasundra and Khandekar, AA; "Concrete Technology"; Dhanpat Rai and Sons, Delhi,
- iii) Gupta BL and Gupta Amit; "Text Book of Concrete Technology"; Standard Publishers Distributors, Delhi.
- iv) Varshney, RS;"Concrete Technology";, Oxford and IBH Publishing, New Delhi
- v) Neville, AM; "Properties of Concrete", Pitman (ELBS Edition available), London
- vi) Orchard; "Concrete Technology"; Vol I, II, and III
- vii) Handoo, BL; Puri, LD and Mahajan Sanjay "Concrete Technology"; Satya Prakashan, New Delhi,
- viii) Sood, Hemant, Mittal LN and Kulkarni PD; "Laboratory Manual on Concrete Technology", CBS Publishers, New Delhi, 2002
- ix) Vazirani, VN; and Chandola, SP; "Concrete Technology"; Khanna Publishers, Delhi,
- x) Gambhir, ML; "Concrete Technology";, MacMillan India Ltd., New Delhi
- xi) Siddique, R., “Special Structural Concretes”, , Galgotia Publishers Pvt. Ltd. Delhi
- xii) Birinder Singh, “Concrete Technology”, Kaption Publications, Ludhiana,
- (xiii) Module on „Special Concretes by Dr Hemant Sood , NITTTR Chandigarh
- (xiv) Concrete Technology by P Dayaratman
- (xv) Video programme on different experiments in „Concrete Technology“ developed by NITTTR, Chandigarh.

1. To determine the physical properties of cement as per IS Codes.
2. To determine flakiness and elongation index of coarse aggregates.
3. To determine silt in fine aggregate.
4. Determination of specific gravity and water absorption of aggregates.
5. Determination of bulk density and voids of aggregates.
6. To determine surface moisture in fine aggregate by displacement method.
7. Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis (grading of aggregate).
8. To determine necessary adjustment for bulking of fine aggregate.
9. To determine workability by slump test.
10. To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump.
11. Compaction factor test for workability.
12. Non destructive test on concrete by: Rebound Hammer Test,Ultrasonic Pulse Velocity Test.
13. Tests for compressive strength of concrete cubes for different grades of concrete

**Rationale**

One of the basic necessities of life is water which is not easily available to a lot of people. Providing potable water at the first place then collection and disposal of waste solids and liquids are important activities of civil engineering field. This subject provides basic knowledge and skills in the field of water supply system and waste disposal system. Classroom instructions should be supplemented by field visits to show functional details of water supply and waste disposal systems. It will also be advantageous to invite professionals from field to deliver extension lectures on specialised operations.

**Detailed Contents****UNIT I**

Introduction: Necessity and brief description of water supply system, Quantity of Water, Water requirement, Rate of demand and variation in rate of demand, Per capita consumption for domestic, industrial, public and fire fighting uses as per BIS standards (no numerical problems), Population Forecasting.

**UNIT II**

Quality of Water and Water Treatment: Meaning of pure water and methods of analysis of water Physical, Chemical and bacteriological tests and their significance, Standard of potable water as per Indian Standard, Maintenance of purity of water (small scale and large scale quantity)

Water Treatment (brief introduction): Sedimentation - purpose, types of sedimentation tanks, Coagulation flocculation - usual coagulation and their feeding, Filtration - significance, types of filters, their suitability, Necessity of disinfection of water, forms of chlorination, break point chlorine, residual chlorine, application of chlorine. Flow diagram of different treatment units, functions of (i) Aeration fountain (ii) mixer (iii) flocculator, (iv) classifier, (v) slow and rapid sand filters (vi) chlorination chamber.

**UNIT III**

Conveyance of Water: Different types of pipes - cast iron, PVC, steel, asbestos cement, concrete and lead pipes. Their suitability and uses, types of joints in different types of pipes. Appurtenances: Sluice, air, reflux valves, relief valves, scour valves, bib cocks, stop cocks, fire hydrants, water meters their working

and uses . Distribution site: Requirement of distribution, minimum head and rate, methods of layout of distribution pipes. Systems of water supply - Intermittent and continuous service reservoirs - types, necessity and accessories. Wastage of water - preventive measures ,Maintenance of distribution system, Leakage detection. Laying out Pipes: Setting out alignment of pipes :Excavation for laying of pipes and precautions to be taken in laying pipes in black cotton soil. Handling, lowering beginning and jointing of pipes, Testing of pipe lines ,Back filling Use of boring rods ,Building Water Supply Connections to water main (practical aspect only);Water supply fixtures and installations and terminology related to plumbing.

#### **UNIT IV**

Waste Water Engineering: Purpose of sanitation, Necessity of systematic collection and disposal of waste. Definition of terms in sanitary engineering ,Collection and conveyance of sewage ,Conservancy and water carriage systems, their advantages and Disadvantages (a) Surface drains (only sketches) : various types, suitability (b) Types of sewage: Domestic, industrial, storm water and its seasonal variation. Sewerage System: Types of sewerage systems, materials for sewers, their sizes and joints. Appurtenance: Location, function and construction features. Manholes, drop manholes, tank hole, catch basin, inverted siphon, flushing tanks grease and oil traps, storm regulators, ventilating shafts .Laying and Construction of Sewers: Setting out/alignment of sewers .Excavations, checking the gradient with boning rods preparation of bedding, handling and jointing testing and back filling of sewers/pipes. Construction of surface mains and different sections required.

#### **UNIT V**

Sewage Characteristics and Treatment of Sewage: Properties of sewage and IS standards for analysis of sewage. Properties of sewage and IS standards for analysis of sewage. Natural Methods of Sewerage Disposal: General composition of sewage and disposal methods ,Disposal by dilution ,Self purification of stream ,Disposal by land treatment ,Nuisance due to disposal. Sewage Treatment: Meaning and principle of primary and secondary treatment and activated sludge process, their flow diagrams, Introduction and uses of screens, grit chambers, detritus tanks, skimming tanks, plain sedimentation tanks, primary clarifiers, secondary clarifiers, filters, control beds, intermittent sand filters, trickling filters, sludge treatment and disposal, oxidation ponds (Visit to a sewage treatment plant). Building Drainage : Aims of building drainage and its requirements Different sanitary fittings and installations Traps, seals, causes of breaking seals

\*\* A field visit may be planned to explain and show the relevant things.

### **Instructional Strategy:**

Before imparting the instructions in the class room, visits to water works and sewage treatment plants can go a long way for increased motivation of students for learning in the class room. As the subject is of practical nature, lecture work be supplemented by field visits from time to time. Home assignments related to collection of information, pamphlets and catalogues from hardware shop dealing water supply and sanitary fittings will be very helpful for the students.

### **References**

1. Duggal, KN; “Elements of Public Health Engineering”;; S. Chand and Co. New Delhi.
2. Rangwala, SC; “Water Supply and Sanitary Engineering”; Anand Charotar Book Stall
3. Kshirsagar, SR; “Water Supply Engineering”; Roorkee Publishing House, Roorkee
4. Kshirsagar, SR; “Sewage and Sewage Treatment”; Roorkee, Roorkee Publishing House
5. Hussain, SK; “Text Book of Water Supply and Sanitary Engineering”; Oxford and IBH Publishing Co, New Delhi,
6. Birdie, GS; “Water Supply and Sanitary Engineering”; Dhanpat Rai and Sons, Delhi Garg, Santosh Kumar; “Water Supply Engineering”; Khanna Publishers, Delhi
7. Garg, Santosh Kumar; “Sewage and Waste Water Disposal Engineering”; Khanna Publishers, Delhi Steel, EW; “Water Supply and Sewerage”; McGraw Hill.
8. Duggal, Ajay K and Sharma, Sanjay, “A Laboratory Manual in Public Health Engineering”, , Galgotra Publications, 2006, New Delhi
9. Gurjar,B.R. “ Sludge Treatment & Disposal” Oxford and IBH Co Pvt Ltd New Delhi.
10. Mahajan Sanjay, Water Supply and Waste Water Engineering, Satya Prakashan Ltd., Delhi.

1. To determine turbidity of water sample
2. To determine dissolved oxygen of given sample
3. To determine pH value of water
4. To perform jar test for coagulation
5. To determine BOD of given sample
6. To determine residual chlorine in water
7. To determine conductivity of water and total dissolved solids
8. To study the installation of following: Water meter Connection of water supply of building with main Pipe valves and bends .Water supply and sanitary fittings
- 9 To study and demonstrate the joining/threading of GI Pipes, CI Pipes, SW pipes, D.I. pipes and PVC pipes.
- 10 To demonstrate the laying of SW pipes for sewers
- 11 Study of water purifying process by visiting a field lab.
- 12 To test house drainage



**Rationale**

Diploma holders in civil engineering have to supervise the construction, repair and maintenance of canals, head works, river training works, cross drainage works, regulatory and other works . Some of diploma holders are also engaged for preventing water logging and irrigation by tubewells. This subject imparts knowledge regarding hydrology, flow irrigation – storage and distribution system, constructional features of head works, river training works, cross drainage works, causes and prevention of water logging and construction of tube wells.

**Detailed Contents****UNIT I**

Introduction: Definition of irrigation ,Necessity & types of irrigation ,History of development of irrigation in India ,Major, medium and minor irrigation projects. Principal crops in India and their water requirements, Crop seasons – Kharif and Rabi .Soil water, soil crop and water relationships, duty, delta and base period, their relationship. Gross commanded area (GCA), culturable commanded area (CCA), intensity of irrigation, irrigable area.

**UNIT II**

Hydrological Cycle Catchment Area and Run-off. Rainfall , definition rain-gauges – automatic and non-automatic, methods of estimating average rainfall (Arithmetic system); catchment area runoff, factors affecting runoff, hydrograph, basic concept of unit hydrograph. Methods of Irrigation; Flow irrigation - its advantages and limitations .Lift Irrigation – Tube well and open well irrigation, their advantages and disadvantages .Sprinkler irrigation conditions favourable and essential requirements for sprinkler irrigation, sprinkler system – classification and component parts .Drip irrigation, suitability of drip irrigation, layout, component parts, advantages.

**UNIT III**

Canals and Wells: Classification, appurtenances of a canal and their functions, sketches of different canal cross-sections (unlined) Various types of canal lining - their related advantages and disadvantages, sketches of different lined canal x-sections Breaches and their control Maintenance of lined and unlined

canals ,Tube Well Irrigation Introduction, occurrence of ground water, location and command, advantages and disadvantages, comparison with canal irrigation .Tube wells, explanation of terms: water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers. Yield of a well and methods of determining yield of well ,Types of tube wells, cavity, strainer and slotted type; Method of boring, installation of well assembly, development of well, pump selection and installation and maintenance .Water Harvesting Techniques: Need and requirement of various methods, Run-off from roof top and ground surface, construction of recharge pits and recharge wells and their maintenance.

#### **UNIT IV**

Dams ,Cross Drainage Works With Sketches: Classification of dams; earthen dams - types, causes of failure; cross-section of zoned earthen dams, method of construction, gravity dams – types, cross-sections of a dam, method of construction Concept of small and micro dams Concept of spillways and energy dissipators Canal Head Works and Regulatory Works. Definition, object, general layout, functions of different parts of head works. Difference between weir and barrage. Cross Drainage Works: Functions and necessity of the following types: aqueduct, super passage, level crossing, inlet and outlet, pipe crossing, Sketches of the above cross drainage works, Definitions of Hydraulic Structures with Sketches: Falls, Cross and head regulators, Outlets, Canal Escapes.

#### **UNIT V**

River Training Works and Water Logging: Methods of river training, guide banks, retired (levees) embankments, groynes and spurs, pitched island, cut-off Water Logging and Drainage and Ground Water Re-charge Definition of water logging – its causes and effects, detection, prevention and remedies, Reclamation of soil. Surface and sub-surface drains and their layout .Concept and various techniques used for ground water re-charge

#### **Instructional Strategy**

The teaching of the subject should be supplemented by field visits at regular intervals of time to expose the students to irrigation works. Students should be asked to prepare and interpret drawings of various irrigation works.

#### **Recommended Books**

1. Bharat Singh, 'Fundamentals of Irrigation Engineering', , Nem Chand and Bros, Roorkee
2. Garg, Santosh Kumar, 'Irrigation Engineering and Hydraulics Structures', Khanna Publishers, Delhi,

3. Punmia, BC; and Pande Brij Bansi Lal, `Irrigation and Water Power Engineering', Delhi, Standard Publishers Distributors, Delhi,
4. Sharma, RK; `Text Book of Irrigation Engineering and Hydraulics Structures', , Oxford and IBH Publishing Company, New Delhi
5. Sharma, SK; `Principles and Practice of Irrigation Engineering', Prentice Hall of India Pvt. Ltd., New Delhi,
6. Varshney RS, Gupta SC, Gupta RL at all. “Theory and Design of Irrigation Structures”, Vol. I and II, Saharsabudhe SR, “Irrigation Engineering and Hydraulic Structures”
7. Priyani BB, „The Fundamental Principles of Irrigation and Water Power
8. BIS Codes
9. Wan. E. Houk, “Irrigation Engineering” Vol. I and II
10. Central Ground Water Board and Central Water Commission Guidelines and Reference Books.

**Rationale**

The important functions of a civil engineer includes the jobs of detailed surveying, plotting of survey data, preparation of survey maps and setting out works. While framing the curriculum for the subject of surveying, stress has been given to the development of knowledge and skill in theodolite surveying, tachometry surveying, curves and use of minor and modern instruments have been included in this subject.

Field work should be a selected one so that student can check his work and have an idea of the results the extent of error in the work done by him. As far as possible, the surveys done should be got plotted, as this will also reveal errors in the work and develop skill in plotting.

**Detailed Contents****UNIT I**

Contouring: Concept of contours, purpose of contouring, contour interval and horizontal equivalent, factors effecting contour interval, characteristics of contours, methods of contouring: Direct and indirect, use of stadia measurements in contour survey, interpolation of contours; use of contour map, Drawing cross section from a contour map; marking alignment of a road, railway and a canal on a contour map, computation of earth work and reservoir capacity from a contour map.

**UNIT II**

Theodolite Surveying: Working of a transit vernier theodolite, axes of a theodolite and their relation; temporary adjustments of a transit theodolite; concept of transiting, swinging, face left, face right and changing face; measurement of horizontal and vertical angles. Prolonging a line (forward and backward) measurement of bearing of a line; traversing by included angles and deflection angle method; traversing by stadia measurement, theodolite triangulation, plotting a traverse; concept of coordinate and solution of omitted measurements (one side affected), errors in theodolite survey and precautions taken to minimize them; limits of precision in theodolite traversing. Height of objects – accessible and non-accessible bases.

**UNIT III**

Tacho-metric surveying: Tachometry, Instruments to be used in tachometry, methods of tachometry,

stadia system of tachometry, general principles of stadia tachometry, examples of stadia tachometry and Numerical problems.

#### UNIT IV

Curves: Simple Circular Curve: Need and definition of a simple circular curve; Elements of simple circular curve - Degree of the curve, radius of the curve, tangent length, point of intersection (Apex point), tangent point, length of curve, long chord deflection angle, Apex distance and Mid-ordinate. Setting out of simple circular curve: By linear measurements only: Offsets from the tangent, Successive bisection of arcs, Offsets from the chord produced, By tangential angles using a theodolite. Transition Curve: Need (centrifugal force and super elevation) and definition of transition curve; requirements of transition curve; length of transition curve for roads; by cubic parabola; calculation of offsets for a transition curve; setting out of a transition curve by tangential offsets only. Vertical curve: Setting out of a vertical curve

#### UNIT V

Introduction to the use of Modern Surveying equipment and techniques such as: EDM or Distomat, Planimeter, Total station, Introduction to remote sensing and GPS. Minor Instruments:-Introduction and use of minor instruments like Ceylon Ghat Tracer, Clinometer, Pantograph, Abney Level etc. Use of planimeter for computing areas

**NOTE:** No sketch of the instruments may be asked in the examination

#### Instructional Strategy

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying, stress should be laid on correct use of various instruments so as to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students

#### Recommended Books

1. Hussain, SK and Nagraj, MS "Text Book of Surveying"; S Chand and Co Ltd., New Delhi
2. Deshpande, RS "A Text Book Surveying and Levelling"; United Book Corporation, Pune,
3. Kocher, CL; "A Text Book of Surveying"; Katson Publishing House Ludhiana,
4. Kanetkar, TP and Kulkarni, SV., "Surveying and Leveling", Poona, AVG Parkashan, Pune
5. Kanetkar, TP; and Kulkarni, SV; "Surveying and Leveling-Vol.2" AVG Prakashan, Pune

6. Punima, BC; "Surveying and Leveling ", Standard Publishers Distributors, Delhi
7. Shahai, PB; "A Text Book of Surveying ", Oxford and IBH Publishing Co.
8. Lilly Sant "Remote Sensing and Image Interpretation"
9. Mahajan, Sanjay, "Surveying-II", Satya Prakashan, Delhi

**UNIT I**

Contouring:

Preparing a contour plan by radial line method by the use of a Tangent Clinometer/Tachometer ,Preparing a contour plan by method of squares .Preparing a contour plan of a Road/Railway track/Canal by taking cross sections.

**UNIT II**

Theodolite: Taking out the Theodolite, mounting on the tripod and placing it back in the box .Study of a transit vernier theodolite; temporary adjustments of theodolite

Reading the vernier and working out the least count, measurement of horizontal angles by repetition and reiteration methods. Measurement of vertical angles and use of tachometric tables. Measurement of magnetic bearing of a line .Running a closed traverse with a theodolite (at least five sides) and its plotting .Height of objects with and without accessible bases

**UNIT III**

Curves :Setting out of a simple circular curve with given data by the following methods

- a) Offsets from the chords produced
- b) One theodolite method

**UNIT IV**

Minor instruments: Demonstration and use of minor instruments like Ceylon Ghat Tracer, Tangent Clinometer, Pantagraph, Abney level etc. Use of planimeter for computing areas

Demonstration of digital instruments through field visits to Survey of India and other government agencies. Total Station (only demonstrations).

**Rationale**

This is a basic engineering subject. The purpose of the subject is to impart basic knowledge and skill regarding properties of materials, concept of stresses and strains, bending moment and shear force diagrams, second moment of area, bending and shear stresses, slope and deflection and analysis of trusses. The above knowledge will be useful for designing simple structural components. This subject is very important to develop basic concepts and principles related to strength of materials. This subject will also enable the students to continue their further education.

**Detailed Contents****UNIT I**

Properties of Materials: Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials. Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals. Simple Stresses and Strains: Concept of stress, normal and shear stresses, Concept of strain and deformation, longitudinal and transverse strain, poisson's ratio, volumetric strain Hooke's law, moduli of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants. Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produced in compound bars (two or three) due to axial load. Stress-strain diagram for mild steel and HYSD steel, mechanical properties, factor of safety. Temperature stresses and strains.

**UNIT II**

Shear Force and Bending Moment: Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: simply supported, cantilever, propped, over hang, cantilever and continuous beams (only concept). Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc) and types of loading (point, uniformly distributed and uniformly varying loads) Concept of bending moment and shear force, sign conventions. Bending Moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to concentrated, uniformly distributed load. Relationship between load, shear force and bending moment, point of maximum bending moment, and point of contraflexure. Moment of Inertia: Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle (*without derivations*). Second moment of area for L, T and I sections, section modulus.



### UNIT III

Bending Stresses in Beams: and Shear Stresses: Concept of pure/simple bending Assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T&L sections only. Moment of resistance Calculations of bending stresses in simply supported beam Combined Direct and Bending Stresses: Concentric and eccentric loads single axis eccentricity only Effect of eccentric load on the section stresses due to eccentric loads, Numerical in the case of short columns. Simple problems on stability of masonry dams and retaining walls

Shear Stresses in Beams: Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections (Formula to be stated, no derivation)

### UNIT IV

Columns : Theory of columns, Eulers and Rankine Formula (No derivation)

Slope and Deflection of Beams, Necessity for Slope and Deflection: Moment area theorem ( no derivation, numerical problems)

### UNIT V

Truss: Introduction to Analysis of Trusses, Concept of a perfect, redundant and deficient frames . Assumptions and analysis of trusses by: Method of joints , Method of sections , Graphical method

### Instructional Strategy

Teachers are expected to give simple exercises involving the applications of various concepts and principles being taught in the subject. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve tutorial sheets independently. In the practical works, individual students should be given opportunities to do practical work, make observations and draw conclusions. Teachers should also conduct viva examination in which stress should be given on the understanding of basic concepts and principles.

### Recommended Books

1. Ramamrutham, S., "Strength of Materials", Dhanpat Rai and Sons., New Delhi
2. Ram Chandra, "Applied Mechanics and Strength of Materials", Standard Publishers. Delhi:
3. Punmia, BC., "Strength of Materials", Standard Publishers, Delhi,
4. Prasad VS " Structural mechanics Galgotia publications Pvt Ltd, Delhi
5. Sadhu Singh "Strengths of Materials" Standard Publishers, New Delhi

6. Singh Birinder “Structural Mechanics” Kaption Publishers, Ludhiana
7. Singh Harbhajan, “ Structural Mechanics” ., Abhishek Publishers, Chandigarh

1. Determination of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel.
2. Testing of HYSD Steel.
3. Determination of Young's modulus of elasticity for steel wire with searl's apparatus.
4. Determination of modulus of rupture of a concrete beam.
5. Determination of maximum deflection and young's modulus of elasticity in simply supported beam with load at middle third point.
6. Verification of forces in a framed structure

**Rationale**

Diploma holders in Civil Engineering are expected to supervise construction of water supply and wastewater treatment works and irrigation structures. This subject aims at imparting skills for preparing water supply and waste water and irrigation engineering drawings to develop competencies for reading the drawings, and their execution in their field

**Detailed Contents****Drawings Exercises****A) Water Supply And Waste Water Engineering Drawing****UNIT I**

Sewage conduits: Drains and Sewers :Cross section of standard types of open drains (circular, v-shaped and □-shaped) with their foundations Cross section of earthen ware and RCC sewer pipes .Cross sections of masonry sewers (circular and egg shaped)

Traps, manholes and inspection chamber: Detailed section of floor trap and gully trap Detailed plan and section of an inspection chamber Detailed plan and section of a manhole .

**UNIT II**

Sewage disposal: Septic Tank and Soak Pit: Detailed plan and cross sections of a domestic septic tank with soak pit for 10 and 50 users.Bath room and W.C connections: Cross-section through the external wall of lavatories at ground and first floor showing the one and two pipe system and the connections of the lavatory to inspection chamber ,Plan of a bathroom showing positions of lavatory, bath tub, wash-basin, taps and showers .

**UNIT III**

Sewage treatment: Detailed Layout Plan of Sewage Treatment Plant for a residential area and Effluent Treatment Plant for an industrial unit. Draw sectional elevation of a two storeyed building showing details of one pipe and two pipes systems with sanitation system. Practice of reading water supply and sanitary engineering working drawings (PWD/urban Development agencies) including hot water and cold water supply system of a two room set.

## **B) Irrigation Engineering Drawing:**

### **UNIT IV**

Channels: Typical cross-section of a channel ,L-section of a channel for given data ,Typical cross section of an unlined and lined channel in cutting, partly cutting and partly filling and fully in filling with given design data. Layout plan of a canal head works.

### **UNIT V**

Dams & Weirs: Draw the typical L-section of a weir,Draw the X-section of an Earthen Dam (Homogeneous ,Zoned type ,Diaphragm type) ,Cross section of a tube well ,Layout and cross section of rain water harvesting system.

### **Instructional Strategy**

Teachers are expected to develop skills in preparation and interpretation of water supply and waste water engineering drawings as per BIS codes of practice. Attention must be paid towards line work, specifications writing, dimensioning, proportioning and accuracy for industrial unit at different intervals of time. Reading and interpreting actual field drawings should also be practiced so as to develop necessary competency in the students.

### **Recommended Books**

1. Loyal JS “Civil Engineering Drawing”, Satya Parkashan, New Delhi
2. Chandel RP “ Civil Engineering Drawings”
3. Kumar; NS “ Civil Engineering Drawing “ IPH, New Delhi
4. Malik RS and Meo GA, “Civil Engineering Drawing” Asian Publishing House, New Delhi

## ENTREPRENEURIAL AWARENESS CAMP

The employment opportunities for diploma holders especially in public sector are dwindling. The diploma holders need to explore the possibilities of becoming entrepreneurs. For this, they must be acquainted with entrepreneurship development, scope of setting up small-scale industry, existing business opportunities, financial support available and various aspects of managing business. In this context, an entrepreneurial awareness camp is suggested. During the camp, experts from various organizations such as banks, financial corporations, service institutes etc. may be invited to deliver expert lectures. Successful entrepreneurs may also be invited to interact with the students. Students may be encouraged to read papers or give seminar during the camp on Entrepreneurship Development related topics.

The camp is to be organized at a stretch for two to three days during fourth semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject

Who is an entrepreneur?

1. Need for entrepreneurship, entrepreneurial career and self employment
2. Scenario of development of small scale industries in India
3. Entrepreneurial history in India, Indian values and entrepreneurship
4. Assistance from District Industries Centres, Commercial Banks, State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other Financial and Development Corporations
5. Considerations for product selection
6. Opportunities for business, service and industrial ventures
7. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
8. Legal aspects of small business
9. Managerial aspects of small business

# ELECTIVE-II (GENERIC)

**RATIONALE**

Entrepreneurship development aim at developing conceptual understanding for setting-up one's own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager.

**DETAILED CONTENTS****UNIT-1**

Entrepreneurship: concept, characteristics, and prerequisites, classification of entrepreneurship, Entrepreneurial Skills, Factors influencing entrepreneurship, Role of entrepreneurship in economic development, Challenges in starting a new venture.

**UNIT-2**

The entrepreneurial process, Developing ideas and business opportunities- methods of generating new idea, New Product development- stages, writing and presentation of the business plan, Market analysis and Feasibility Planning.

**UNIT-3**

Financing the venture & other support systems- Early stage finances and growth funding, Commercial banks- types of bank loans; District Industry centres (DICs), State Financial Corporations. Small Industries Development Bank of India, National Bank of Agriculture and Rural development (NABARD). How to start a small scale industry (SSI), Procedures for registration of SSI.

**UNIT-4**

Patents, Trademarks and Copyrights- concept and its application in the market, Intellectual property infringement; mergers and acquisition; corporate social responsibility.

**UNIT-5**

Going public: Advantages and Disadvantages. Harvesting the venture and other strategies, Buyout Agreement Negotiation and Time Management.

**RECOMMENDED BOOKS**

1. Agarwal, Vinod K, Initiative enterprise and economic choice in a study of the paters of entrepreneurship. Munshiram Manoharlal, New Delhi.
2. Clifton, Davis S and F Y fir, David E, project feasibility analysis, John Willey, New York.
3. David H Holt, Entrepreneurjrship: New Venture creation, Prentice Hall.
4. Deasi vasant, Entrepreneurial Development, Himalayas publishing house.
5. Druker peter, Innovation and Entrepreneurship, Heinemann London.
6. Kumar S.A, Entgpreneurship in small industry, Discovery Publishers New Delhi.
7. Pareek Vdai and Venkeateshwatra Rao T : Developing Entrepreneurship: A handbook of learning system, New Delhi.



**RATIONALE**

The diploma holders are generally expected to take up middle level managerial positions, their exposure to basic management principles is very essential. Various Topics have been included in the subject to provide elementary knowledge about these management areas

**DETAILED CONTENTS****UNIT 1.**

Introduction: Management, nature, process and significance of Management; Managerial skills; Managerial Roles; Overview of functional areas of management-Marketing, Finance, Production, HRM, IT, Development of managerial Thought. Taylor concept, Henry Fayol, Elton Mayo concept. Contingency approach overview.

**UNIT 2.**

Planning: Concept, Process and Types; concept of Decision making; Decision making process; Factors affecting decision making process; Management by objectives (MBO) & Management by Exception (MBE). Planning-analysis and diagnosis, Strategy formulation.

**UNIT 3**

Organising: Concept, nature, process and Significance; Authority and responsibility relationship- Delegation, Centralisation & Decentralisation; formal and informal organisation structures. Hierarchy and flat structures.

**UNIT 4**

Directing and leading, Concept, Nature, Scope and principles of Direction, Manager versus leaders; Leadership Theories – Trait Theories, Concept of motivation and how to motivate employees in organisation.

**UNIT 5**

Controlling; Meaning and process of control, Types of control , steps in control process. Control tools and techniques- informational controls and financial controls.

**RECOMMENDED BOOKS**

1. L.M.Prasad. Principal and Practice of Management.
2. George R. Teery and Stephan G. Franklin. Principles of Management. AITBS Publications.
3. Knootz, Harold and Weihrich. Esserentials of Management. TMH Publications.
4. Burton and Thakur. Management Today (Principles and practices). TMH Publications.
5. Stones, Freeman, Gilbreth, Management. PHI Publications 6<sup>th</sup> Edition.

**RATIONALE**

Arabic is becoming a popular language to learn in the Western world, even though Arabic grammar is sometimes very hard to learn for native speakers of Indo-European languages. Many other languages have borrowed words from Arabic, because of its importance in history. This includes support from beginning to study abroad programs, intensive instruction opportunities, teacher exchanges, employment and professional development.

**DETAILED CONTENTS****UNIT 1**

Lesson no. 1 to 6

**UNIT 2**

Lesson no. 7 to 13

**UNIT 3**

Lesson no. 14 to 18

**UNIT 4**

Lesson no. 19 to 23

**UNIT 5**

Al - Quran (from Surah Al-feel to Surah Al-Naas) with translation and brief commentary.

**RECOMMENDED BOOKS**

Duroos-ul-Lughat-il-Arabiyyah li Ghayr-in-Naatiqeena bihaa Part-I by Dr. V Abdul Rahim;  
Published by: Islamic Foundation Trust 78, Perambur High Road Chennai -600012

**DETAILED CONTENTS****UNIT 1**

Introduction: Introduction to operation Research, Linear Programming problem, Formulation of LPP, Graphical solution of LPP, simplex method, artificial variables, big-M method.

**UNIT 2**

Transportation Problems: Formulation, solution of balanced transportation problem. Finding initial basic feasible solutions à €. North-west corner rule, least cost method and Vogoles approximation method.

**UNIT 3**

Assignment Model and Hungarian method: Assignment Model Formulation, Hungarian method for optimal solution; solving unbalanced problems; travelling salesman problem and assignment.

**UNIT 4**

Sequencing Models: Solution of sequencing problem à €; processing n jobs through two machines, à € processing n jobs through three machines à €; Processing two jobs through m machines.

**UNIT 5**

Dynamic Programming: Introduction to Dynamic programming problems, Characteristics and applications of Dynamic Programming, Mathematical formulation and optimal Solution of Dynamic Programming problems.

**RECOMMENDED BOOKS**

1. P. Sankaralyer, à € Operations Research, Tata McGraw Hill 2008
2. A.M. Natarajan, P.Balasubramani, A. Tamilarasi, à € Operations, Pearson Education, 2005.

