

4.1 GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT

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RATIONALE

Generic Skills and Entrepreneurship Development is one of the courses from “Human Science” subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aims 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. Both the subject areas are supplementary to each other and soft skills are required to be developed in diploma pass-outs for enhancing their employability and self confidence.

LEARNING OUTCOMES

After undergoing the subject, the student will be able to:

- Explain the importance of generic skills
- Manage himself/herself physically, intellectually and psychologically
- Work effectively as a team member
- Manage tasks effectively
- Develop an entrepreneurial mindset.
- Identify entrepreneurial support system for new ventures and small businesses.
- Recognize a business opportunity.
- Conduct market survey and prepare project report.

DETAILED CONTENTS

1. Introduction to Generic Skills (04 hrs)

Importance of Generic Skill Development

Life Long Learning and associated importance of Generic Skill Development

2. Managing Self (07 hrs)

Knowing Self for Self Development

- Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.

Managing Self - Physical

Personal grooming, Health, Hygiene, Time Management

Managing Self – Intellectual development

- INFORMATION SEARCH: SOURCES OF INFORMATION
- COMMUNICATION: OFFICIAL & BUSINESS CORRESPONDENCE, JOB APPLICATION COVERING LETTER AND RESUME

Managing Self – Psychological

- Stress, Emotions, Anxiety-concepts and significance
- Techniques to manage stress

3. Managing in Team (06 hrs)

Team - definition, team dynamics

Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background

4. Task Management (03 hrs)

Task Initiation, planning, execution, close out

Exercises/case studies on task planning towards development of skills for task management

5. Problem Solving (05 hrs)

Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving

Different approaches for problem solving.

Steps followed in problem solving.

Exercises/case studies on problem solving.

6. Entrepreneurship (20 hrs)

Introduction

- Concept/Meaning and its need
- Qualities of an entrepreneur
- Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.

Obtaining financial assistance through various government schemes like Prime Minister Employment Generation Program (PMEGP) Pradhan Mantri Mudra Yojana (PMMY) , Make in India, Start up India, Stand up India, National Urban Livelihood Mission (NULM); Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP).

Market Survey and Opportunity Identification (Business Planning)

- How to start a small scale unit/ industry
- Procedures for registration of small-scale unit /industry
- Assessment of demand and supply in potential areas of growth.
- Understanding business opportunity
- Considerations in product selection

Project Report Preparation

- Preliminary Project Report
- Techno-Economic Feasibility Report
- Exercises on preparation of Detailed Project Report

INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. Some of the topics may be taught using question answer, assignment, case studies or seminar. In addition, expert lectures may be arranged from within the institution or from management organizations. Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial

qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also. The students may also be provided relevant text material and handouts.

RECOMMENDED BOOKS

1. Balasubramanian, S., “Soft Skills for Interpersonal Communication”, Orient Black Swan, New Delhi.
2. “Lifelong learning”, Policy Brief (www.oecd.org).
3. Rathore, BS, and Dr JS Saini, “A Handbook of Entrepreneurship”, Aapga Publications, Panchkula (Haryana).
4. Gupta, CB, and P Srinivasan, “Entrepreneurship Development”, Sultan Chand and Sons, New Delhi.
5. “Entrepreneurship Development”, Tata McGraw Hill Publishing Company Ltd., New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1.	04	06
2.	07	08
3.	06	06
4.	03	04
5.	05	06
6.	20	20
Total	45	50

4.2 CONCRETE TECHNOLOGY

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2	4

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.

LEARNING OUTCOMES

After going through the subject, the students will be able to:

- Evaluate physical properties of cement concrete as per IS codes
- Conduct various tests on aggregate in laboratory to evaluate their characteristics
- Interpret the grading charts of different aggregates and evaluate fineness modulus of aggregates
- Evaluate workability and strength of concrete
- Recognise bleeding, segregation, harshness defects in fresh concrete
- Conduct various destructive and non-destructive (NDT) test
- Design mix of concrete as per IS code
- Demonstrate how to carry out various concreting operation

DETAILED CONTENTS

1. Introduction: Definition of concrete, uses of concrete in comparison to other building materials. (01 hrs)
2. Ingredients of Concrete (04 hrs)

Cement: physical properties of cement; different types of cement as per BIS Codes

Aggregates:

- Classification of aggregates according to size and shape
- Characteristics of aggregates: Particle size and shape, surface texture, specific gravity of aggregate; bulk density, water absorption, surface moisture, bulking of sand, deleterious materials soundness
- Grading of aggregates: coarse aggregate, fine aggregate; All-in-aggregate; fineness modulus; interpretation of grading charts

Water: Quality requirements as per IS:456-2000

3. Water Cement Ratio (01 hrs)

Hydration of cement principle of water-cement ratio, Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete

4. Properties of Concrete (6 hrs)

Properties in plastic state: Workability, Segregation, Bleeding and Harshness, Factors affecting workability

Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes.

5. Concrete Mix Design (04 hrs)

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.

6. Introduction to Admixtures (chemicals and minerals) for improving performance of concrete. (01 hrs)

7. Special Concretes (only features) (04 hrs)

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

8. Concreting Operations (8 hrs)

****8.1 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

****8.2 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

****8.4 Mixing:**

- Hand mixing
- Machine mixing - types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers
- Maintenance and care of mixers

****8.5 Transportation of concrete: Transportation of concrete using: wheel barrows, transit mixers, chutes, belt conveyors, pumps, tower crane and hoists etc.**

8.6 Placement of concrete:

Checking of form work, shuttering and precautions to be taken during placement

****8.7 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:

- Objective 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

Defects in concrete: Identification of defects and methods of removing defects

9. Importance and methods of non-destructive tests (introduction only) (1 hr)

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

PRACTICAL EXERCISES

1. To determine silt content in fine aggregate
2. Determination of specific gravity and water absorption of aggregates
3. Determination of bulk density and voids of aggregates
4. Determination of particle size distribution of fine, coarse and all-in-aggregate by sieve analysis (grading of aggregate)
5. To determine workability by slump test and to verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump
6. Compaction factor test for workability
7. Non destructive test on concrete by:
 - a) Rebound Hammer Test
 - b) Ultrasonic Pulse Velocity Test
8. To determine compressive strength of concrete cubes for different grades of concrete
9. To determine flexural strength of concrete beam
10. Concrete Mix Design

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 also be demonstrated to students through video programmes developed in the field of 'concrete technology' by NITTTR, Chandigarh.

RECOMMENDED BOOKS

1. Kulkarni, PD, RK Ghosh, and YR Phull, "Text Book of Concrete Technology", Oxford and IBH Publishing Co. New Delhi.
2. Gupta, BL, and Gupta Amit, "Text Book of Concrete Technology", Standard Publishers Distributors, Delhi.
3. Handoo, BL, LD Puri, and Sanjay Mahajan, "Concrete Technology", Satya Prakashan, New Delhi.
4. Sood, Hemant, LN Mittal, and PD Kulkarni, "Laboratory Manual on Concrete Technology", CBS Publishers, New Delhi, 2002.
5. Gambhir, ML, "Concrete Technology", MacMillan India Ltd., New Delhi.
6. Singh, Birinder, "Concrete Technology", Kaption Publications, Ludhiana.
7. "Video programme on different experiments in 'Concrete Technology' developed by NITTTR", Chandigarh.

WEBSITES FOR REFERENCES

- 1 <https://www.youtube.com/channel/UC7R0m2JO9EsJNJZPDR2U7YQ>
- 2 <https://theconstructor.org/home-page>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	1	2
2	4	8
3	1	3
4	6	8
5	4	5
6	1	3
7	4	6
8	8	13
9	1	2
Total	30	50

4.3 WATER SUPPLY AND WASTE WATER ENGINEERING

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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 specialized operations.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Calculate the water requirement for a particular population
- Check and improve the quality of water by giving required treatment to water
- Calculate the size of different pipes to carry water
- Lay the network of pipes for water supply as well as sewerage in a building
- Draw the location of different appurtenances
- Carry out the disposal of sewage
- Supervise the water supply and waste water schemes

DETAILED CONTENTS

A. WATER SUPPLY

- | | | |
|----|---|----------|
| 1. | Introduction
Necessity and brief description of water supply system.
Sources of water – surface/sub-surface sources | (02 hrs) |
| 2 | Quantity of Water

Water requirement
Rate of demand and variation in rate of demand | (03 hrs) |

Per capita consumption for domestic, industrial, public and fire fighting uses as per BIS standards (no numerical problems)

3. Quality of Water (04 hrs)

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

4. Water Treatment (brief introduction) (06 hrs)

**4.1 Sedimentation - purpose, types of sedimentation tanks
**4.2 Coagulation/floculation - usual coagulation and their feeding
**4.3 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.

5. Conveyance of Water (05 hrs)

**5.1 Different types of pipes - cast iron, PVC, steel, asbestos cement, concrete PPR pipes and lead pipes. Their suitability and uses, types of joints in different types of pipes.
5.2 Distribution system: 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

6. Laying of Pipe (02 hrs)

Setting out alignment of pipes

Handling, lowering and jointing of pipes
Testing of pipe lines

7. Building Water Supply (02 hrs)

Connections to water main (practical aspect only)

B. WASTE WATER ENGINEERING

8. Introduction (03 hrs)

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

9. Sewerage System (03 hrs)

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

10. Laying and Construction of Sewers: (03 hrs)

Excavations, checking the gradient with boning rods preparation of bedding,
handling and jointing testing and back filling of sewers/pipes.

11. Sewage Characteristics: (03 hrs)

Properties of sewage and IS standards for analysis of sewage
Physical, chemical and bacteriological parameters

12. Natural Methods of Sewerage Disposal (02 hrs)

Disposal by dilution
 Self purification of stream
 Disposal by land treatment

13. Sewage Treatment (06 hrs)

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)

14. Building Drainage (01 hrs)

Aims of building drainage and its requirements

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

PRACTICAL EXCERCISES

- 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:
 - a) Water meter
 - b) Connection of water supply of building with main
 - c) Pipe valves and bends
 - d) Water supply and sanitary fittings
- 9) To study and demonstrate the joining/threading of GI Pipes, CI Pipes, SWG pipes, PVC pipes and copper pipes.

- 10) To demonstrate the laying of SWG pipes for sewers
- 11) Study of water purifying process by visiting a field lab.
- 12) Demonstration of plumbing tools.

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.

RECOMMENDED BOOKS

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 Publishing House, Roorkee.
5. Gurjar, BR, “Sludge Treatment and Disposal”, CRC Press.
6. Garg, Santosh Kumar, “Water Supply Engineering”, Khanna Publishers, Delhi.
7. Duggal, Ajay K and Sanjay Sharma, “A Laboratory Manual in Public Health Engineering”, Galgotra Publications, New Delhi.
8. Mahajan, Sanjay, Water Supply and Waste Water Engineering ,’Satya Prakashan Ltd., Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	2	2
2	3	3
3	4	5
4	6	7
5	5	6
6	2	2
7	2	2
8	3	3
9	3	3
10	3	3
11	3	3
12	2	3
13	6	7
14	1	1
Total	45	50

4.4 WATER RESOURCES ENGINEERING

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RATIONALE

Diploma holders in civil engineering have to supervise the construction, repair and maintenance of canals, head 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, cross drainage works, causes and prevention of water logging and construction of tube wells.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Recognize different crops and their water requirements
- Measure rainfall and read rain gauges and hydrographs
- Supervise construction and maintenance work of canal and canal linings
- Use various water harvesting techniques
- Supervise maintenance and construction work of canal head works and cross regulators
- Carry out de-silting operation of canals

DETAILED CONTENTS

- | | | |
|----|---|---------|
| 1. | Introduction | (2 hrs) |
| | Definition of irrigation
Necessity of irrigation
Brief history of development of irrigation in India
Organisational structure of water resources department. | |
| 2. | Water Requirement of Crops | (4 hrs) |

Principal crops in India and their water requirements

Crop seasons – Kharif and Rabi

Duty, Delta and Base Period, their relationship

Gross commanded area (GCA), culturable commanded area (CCA), Intensity of Irrigation, Irrigable area (Basic introduction without numericals)

3. Catchment Area and Run-off (4 hrs)

Rain-gauges and their types (automatic and non-automatic), methods of estimating average rainfall (Arithmetic system); catchment area runoff, factors affecting runoff, basic concept of hydrograph and unit hydrograph.

4. Methods of Irrigation (6 hrs)

Flow irrigation and its advantages and limitations

Lift Irrigation and its advantages and limitations.

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.

5. Canals (6 hrs)

Classification, different canal cross-sections, working head and discharge measurement units for canals.

Canal lining - its advantages and disadvantages, Brief description about various types of canal lining.

Breaches and their control

Maintenance of lined and unlined canals

6. Tube Well Irrigation (6 hrs)

Introduction, location and command, 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 formulae for determining yield of well

Types of tube wells and their choice-cavity, strainer and slotted type;

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.

7. Dams (5 hrs)

Classification of dams; earthen dams - types, causes of failure; cross- section of zoned earth dam, description about various methods of construction, gravity dams types, cross-sections of a dam. –

Concept of small and micro dams

Basic concept of spillways and energy dissipaters

8. Canal Head Works and Regulatory Works (6 hrs)

Definition, object, general layout and different parts of head works. Difference between weir and barrage

Definition and function of cross and head regulators.

Outlets-Types and sketches.(Important terms: minimum modular head, width horizontally ,depth vertically of outlet, crest level, difference between FSL and crest level of outlet etc.)

Falls

Canal escapes.

9. Cross Drainage Works (2 hrs)

Functions and types: aqueduct, super passage, level crossing, inlet and outlet

Sketches of the above cross drainage works

10. River Training Works (1 hr)

Importance of river training works and its components

11. Water Logging and Drainage (3 hrs)

Definition of water logging – its causes, effects and remedies

Surface and sub-surface drains and their layout

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. Singh, Bharat, 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, “Theory and Design of Irrigation Structures”, Vol. I and II.
7. Saharsabudhe, SR, “Irrigation Engineering and Hydraulic Structures”.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	2	03
2	4	05
3	4	05
4	6	07
5	6	07
6	6	07
7	5	06
8	6	07
9	2	03
10	1	02
11	3	03
Total	45	50

4.5 MODERN SURVEYING

L	P
2	4

RATIONALE

The important function 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 this subject of Modern Surveying, stress has been given to the development of knowledge and skill in modern surveying instruments used for surveying nowadays

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 on sheets, as this will also reveal errors in the work and develop skill in plotting.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Measure inaccessible distances.
- Conduct survey of an area using Total Station.
- Make layout of an area using Total Station
- Draw a contour plan of an area manually and using computer software
- Conduct GPS survey of an area.
- Set out simple circular curve.

DETAILED CONTENTS

1. Tachometry and electronic distance measurement (4 hrs)

Tachometry, Instruments to be used in tachometry, methods of tachometry, general principles of stadia tachometry

Tachometric Constant, Examples of stadia tachometry and Numerical problems.

Electronic distance measuring Instruments, Working Principle, Types, Uses,

Advantages and Disadvantages of tachometry and Electronic Distance Measurement

2. Total station survey (6 hrs)

Introduction, Working Principle, Parts of Total Station, Sources of Error
Infrared And Laser Total Station Instruments, Microwave System, Measuring
Principle of Total Station Instruments.

Comparison between Electro-optical (Infrared and Laser) and Microwave system.
Care and maintenance of Total Station instruments,
Traversing and Trilateration, Resection, Coordinate and Geometry
functions, offsets and stake out-land survey applications.

3. Contouring (4 hrs)

Concept of Contours, Purpose of Contouring,
Contour Interval and Horizontal Equivalent, Factors Effecting Contour Interval
Characteristics of Contours

Methods of Contouring: Direct and Indirect, Interpolation of Contours.

Uses of contour map,

Volume calculation using contours.

4. Global positioning system (6 hrs)

Basic concepts of GPS, Historical perspective and development, Geoid and
Ellipsoid

Applications of GPS in Land Surveying,

Positioning concept, Different segments of GPS - Space, Control and User
Segment

Global navigation satellite system (GNSS), independent regional navigation
satellite system (IRNSS) and GPS Aided GEO Augmented Navigation (GAGAN)

GPS satellite signals, Static, Kinematic and Differential GPS

Advantages and disadvantages of GPS Surveying

5. Introduction to geographic information system (6 hrs)

Definition of Geographic Information Systems, Advantages and Disadvantages of Geographic Information Systems,
 Different types of map projections,
 Concept of vector data and Raster data models, Advantages and disadvantages associated with vector and raster data, Different raster data file formats,
 Spatial database systems and their types, Spatial data interpolation.
 Applications of Geographic Information Systems

6. Curves (4 hrs)

Horizontal Curves, Types of Horizontal Curves (Simple Circular, Compound, Reverse, Deviation & Transition).

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.

Vertical Curves, Types of Vertical Curves (Summit and Valley).

NOTE: No sketch of the instruments should be asked in the examination

PRACTICAL EXERCISES

1. Tachometry and electronic distance measurement
 - a) Measure distances by using tachometer
 - b) Measure distances by using EDM
2. Total station survey

Unboxing total station instrument and understanding its components

 - a) Plotting a traverse using total station
 - b) Conducting survey of an area using total station
 - c) Determination of remote height using total station
 - d) Layout of a 2-room set using total station
3. Contouring
 - a) Preparing a contour plan by radial line method

- b) Preparing a contour plan by method of squares
- 4. GPS Surveying
 - a) Unboxing and setting of DGPS instrument
 - b) Survey of a small area using GPS measurements.
- 5. Geographic information system
 - a) Preparation of map of a previously total station surveyed area using GIS.
 - b) Plotting contours using GIS software.
- 6. Curves
 - a) Setting out of a simple circular curve by using chain or tape.
 - b) Setting out of a simple circular curve by using theodolite.
 - c) Setting out of a simple circular curve by using total station.

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments and software use in surveying, stress should be laid on correct use of various instruments to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students, technical visit to Punjab Remote Sensing Center (Ludhiana) is recommended.

RECOMMENDED BOOKS

1. Hussain, SK and Nagraj, MS, "Text Book of Surveying", S Chand and Co Ltd., New Delhi.
2. Kocher, CL, "A Textbook of Surveying", Katson Publishing House, Ludhiana.
3. Kanetkar, TP, and Kulkarni, SV., "Surveying and Leveling", Poona, AVG Parkashan, Pune.
4. Duggal, S K, "Surveying Vol-I", McGraw Hill.
5. Gopi, Satheesh, R. Sathikumar, N. Madhu, "Advanced Surveying: Total Station", GIS and Remote Sensing, Pearson.

WEBSITES FOR REFERENCES

1. <https://nptel.ac.in/courses/105107157>
2. <https://nptel.ac.in/courses/105102015>
3. <https://nptel.ac.in/courses/105107155>
4. <https://nptel.ac.in/courses/105104100>

RECOMMENDED GIS SOFTWARES

1. QGIS, <https://www.qgis.org/>, Open Source, Free Download
2. GVSIG, <http://www.gvsig.com/>, Open Source, Free Download
3. OrbisGIS, <http://orbisgis.org/>, Open Source, Free Download
4. ArcGIS, <https://www.arcgis.com/>, Paid
5. Google Earth, <https://earth.google.com/>, Freeware

SUGGESTED DISTRIBUTION OF MARKS

Topic Number	Time Allotted (hrs)	Marks Allotted (Out of 50)
1	4	9
2	6	7
3	4	9
4	6	9
5	6	9
6	4	7
TOTAL	30	50

PUBLIC HEALTH AND WATER RESOURCES ENGINEERING DRAWING

L P
- 4

RATIONALE

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

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Draw the drawings of traps, manholes and inspection chambers
- Draw the drawing of water supply plan of building
- Draw the sewerage plan of buildings
- Draw the drawing of channel (L-section and cross-section)
- Draw and demonstrate cross-section of an earthen dams
- Draw layout plan of a canal head works
- Read and interpret the engineering drawings

DETAILED CONTENTS CUM PRACTICALS

PART A: WATER SUPPLY AND WASTE WATER ENGINEERING DRAWING

- | | | |
|----|---|-----------|
| 1. | Cross section of earthen ware and RCC sewer pipes. | (1 Sheet) |
| 2. | Traps, manholes and inspection chamber | |
| | 2.1 Detailed section of floor trap and gully trap. | (1 Sheet) |
| | 2.2 Detailed plan and section of an inspection chamber. | (1 Sheet) |
| | 2.2 Detailed plan and section of a manhole. | (1 Sheet) |
| 3. | Detailed plan and cross sections of a domestic septic tank with soak pit for 5-10 users | (1 Sheet) |

4. Bathroom and W.C Connections

Draw sectional elevation through the external wall of two-storey building including lavatories at ground and first floor showing the one pipe system and the connections of the lavatory to inspection chamber. (1 Sheet)

Draw detailed plan of a bathroom showing positions of lavatory, bathtub, wash-basin, taps and showers and show the connection of floor trap, gully trap and inspection chamber. (1 Sheet)

5. 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.

PART B: WATER RESOURCES ENGINEERING DRAWING:

1. Typical cross section of an unlined and lined channel in cutting, partly cutting and partly filling and fully in filling with given design data. (3 Sheets)
2. Draw Layout plan of detailed components of canal head works. (1 Sheet)
3. Draw Layout plan of Cross Drainage Works including Aqueduct, Super passage, Level Crossing, Inlet & Outlet. (1 Sheet)
4. Draw the X-section of Zoned type Earthen Dam. (1 Sheet)
5. Cross section of a tube well. (1 Sheet)
6. Layout and cross section of rainwater harvesting system (1 Sheet)

Important Note:

- i. Use of BIS: 456-2000 is permitted in the examination
- ii. Paper should be set from Part A and Part B of equal marks

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”, Katson Publishing House.
3. Kumar, NS, “Civil Engineering Drawing”, IPH, New Delhi.
4. Malik, RS, and Meo GA, “Civil Engineering Drawing”, Asian Publishing House, New Delhi.

**MINOR PROJECT WORK
(CONSTRUCTION SITE ORIENTED)**

L P
- 6

RATIONALE

Minor project work aims at exposing the students to field practices, size and scale of operations and work culture at works sites. For this purpose, students during middle of course, are required to be sent at different work sites where some construction activities are in progress or some operations are going on.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Apply concepts, principles and practices taught in the classroom in solving field problems.

GENERAL GUIDELINES

Depending on the interests of the students, they may be sent to following (or any other field project related to Civil Engineering):

- i) Building construction sites
- ii) Water treatment plant, Sewage treatment plant
- iii) Crusher plant, Cement Manufacturing Plant, Brick kiln
- iv) Highway construction site
- v) Material and Soil testing laboratory, Soil investigation projects
- vi) Hydel Power Project
- vii) Land surveying projects
- viii) Community development works
- ix) Constructional site like building, bridge, tunnel, canal lining, highway, railway track, irrigation works etc.

As a minor project activity, each student is supposed to study the operations at site and prepare a detailed project report of the observations/processes seen by him/her and give

seminar using computer aided presentation slides using photographs. These students should be guided by respective subject teachers. Each teacher may guide a group of 10 – 15 students.

The teachers along with field supervisors will conduct performance assessment of students. Some of the projects are suggested below:

1. Survey of a village approach road, drawings of L-section and x-sections
2. Estimation of white washing and distempering in hostel building
3. Preparation of detailed estimate with drawings of septic tank for 30-40 users
4. Plumbing work and installation of PVC over-head water tank on a toilet block and then prepare report
5. Construction of different components of a building
6. Identification of water-supply fittings and replacement of defective fittings and then prepare report.
7. Construction of a pipe/slab culvert
8. Ferro-cement construction techniques
 - a) Low cost housing
 - b) New construction materials
9. Study and preparation of models of hydraulic pumps.

This Industry oriented minor project work will carry 50 marks for internal assessment.

A group of students not exceeding 5 may work on any one project. Each student will prepare the project report of the activities observed by him. They will study the whole process of the plant, and explain the same in their project report. Further they are required to present the Project Report of work done by them through seminar in the class for internal assessment. External examiner will ask the questions on the construction, working, processes observed by the students during their project work: Shortcomings in the works (site) and their remedial measures may be suggested by the students.

NOTE:

This is only a suggestive list. The students may take any other problem as per their interest. The students of the class may be divided into five groups and work may be assigned to each group as per their interest.

EVALUATION OF STUDENTS FOR MINOR PROJECT

The criteria for evaluation of minor project work is as follows :

Criteria	Weightage
Punctuality and Regularity	10 %
Planning and Execution	30%
Initiative in learning new things	10%
Report Writing	20%
Presentation and Viva	30%

Note :

A viva voce examination will be conducted at the end of minor project for assessing the work of student. The examination Committee for this purpose will consist of a professional and the teacher who has guided the project.

ENTREPRENEURIAL AWARENESS CAMP

This 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.

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

INDUSTRIAL TRAINING OF STUDENTS

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of a minimum of 6 weeks duration to be organised during the semester break starting after second year i.e. after 4th semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 50 and external assessment of 50 marks have been provided in the study and evaluation scheme of 5th Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.

Teachers and students are requested to see the footnote below the study and evaluation scheme of 4th semester for further details.

The teacher along with field supervisors will conduct performance assessment of students. The components of evaluation will include the following:

- | | | |
|----|-----------------------------------|-----|
| a) | Punctuality and regularity | 15% |
| b) | Initiative in learning new things | 15% |
| c) | Relationship with workers | 15% |
| d) | Industrial training report | 55% |