

West Bengal State Council of Technical &
Vocational Education and Skill
Development
(Technical Education Division)



Syllabus
of

Diploma in Survey Engineering [SE]

Part-III (5th Semester)

Revised 2022

5TH SEMESTER

SL NO	CODE	COURSE TITLE	CREDI T	CLASS/WK			EXAMINATION SCHEME						
				L	T	P	INTERNAL			ESE	PIA	PEA	TOTAL
							INT	AS/QZ	ATD				
1	SEPC301	Design of R.C.C. Structure	3	3	-	-	20	10	10	60	-	-	100
2	SEPC303	Railway & Tunnel Survey	2	2	-	-	20	10	10	60	-	-	100
3	SEPC305	Advanced Survey	2	2	-	-	20	10	10	60	-	-	100
4	SEPC307	Route Survey	2	2	-	-	20	10	10	60	-	-	100
5	SEPE301	Program Elective -II	3	3	-	-	20	10	10	60	-	-	100
6	SEPE303	Program Elective -III	3	3	-	-	20	10	10	60	-	-	100
7	SEPC309	Field Survey Practices – III	3	-	-	6	-	-	-	-	60	40	100
8	SEPC311	Quantity Survey	1	-	-	2	-	-	-	-	60	40	100
9	SI301	Internship -II	1	-	-	-	-	-	-	-	100	-	100
10	PR301	Major Project	1	-	-	2	-	-	-	-	60	40	100
TOTAL			21	15		10	-	-	-	-	-	-	1000

SEPE 301: Any one of the three subjects 1. Municipal Engineering, 2. Water Resource Engineering, 3. Design of Steel Structure.

SEPE 303: Any one of the three subjects 1. Irrigation Engineering 2. Construction Management, 3. Landscape Design

STUDENT CONTACT HOURS PER WEEK: 25 Hrs. Theories and Practical Period of 60 Minutes each.

L – Lecture, T–Tutorial, P –Practical, INT- Internal Assessment AS/QZ– Assignment /Quiz ATD- Attendance ESE – End Semester Exam, PIA-Practical Internal Assessment, PEA-Practical External Assessment.

Name of the Course: Diploma in Survey Engineering	
Course Title: Design of R.C.C. Structure	Course Code: SEPC301
Number of Credits: 3	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 3 hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 45 hrs.	End Semester Examination: 60 marks

Pre-requisites : 1. Student should be perfect in engineering mechanics
2. Students should know the properties of the materials being used.

Course Category : PC

Course Objective

On successful completion of the course the students will be able to:

- Understand the basic principles of design of R.C.C. structure.
- Design the section by Limit State Method (LSM)
- Use & Correlate the specifications of IS: 875, IS 456: 2000 & SP-16.
- Draw and appreciate the proper reinforcement detailing of R.C. structural member and their connection using SP-34 & IS 13920.

Unit	Course Content	Hour/Unit	Marks
Unit 1	<p>INTRODUCTION</p> <p>Introduction to IS 456 : 2000, IS: 875 (Part-I to Part III), SP-16, SP- 34 & IS13920. General concept of loads on structures (Dead Load, Live Load, Wind Load, Combination of Loads).</p> <p>Methods of design (Working Stress & Limit State Method), Comparison between Working Stress & Limit State methods, Assumptions in Working Stress Method (W.S.M.), Equivalent Bending Stress Distribution Diagram</p> <p>RCC DESIGN OF BEAMS [LSM]</p> <p>Basic concepts of Reinforced Cement Concrete (Materials, Application areas)</p> <p>Element of R.C.C. Design. Complete design of simply</p>	25	30

	<p>supported singly reinforced R.C.C. rectangular beams, double reinforced rectangular beam, shear force, and bond in RCC members.</p> <p>RCC DESIGN OF SLABS [LSM]</p> <p>Complete design with detailing of one-way simple supported and cantilever slab.</p> <p>Design of two-way slabs and details of reinforcement.</p>		
Unit 2	<p>RCC DESIGN OF COLUMNS [LSM]</p> <p>Difference between short and long columns. Design of an axially loaded short column by IS code formula and details of reinforcement</p> <p>RCC DESIGN OF STAIRCASE [LSM]</p> <p>Design & detailing of RCC staircases (Dog Legged type) of simple slab type.</p> <p>RCC DESIGN OF FOUNDATION AND MISCELLANEOUS STRUCTURES [LSM]</p> <p>Design of isolated RCC footing and reinforcement details.</p> <p>General Concept of Combined Footing, Strip Foundation, Mat & Raft Foundation (not involving structural design)</p> <p>PRESTRESSED CONCRETE</p> <p>Introduction to Prestressed Concrete, Externally and Internally Prestressed Member, Methods of Prestressing (Pre tensioning and Post-tensioning), Advantages and Disadvantages of Prestressed Concrete.</p>	20	30
Total		45	60

Suggested Learning Resources:

- Design of Reinforced Concrete Structure by N. Subramanian, Oxford University Press
- Design of RCC structure by Pillai and Menon, Tata-Mcgraw hill.
- Reinforced Concrete by Punmia, Jain & Jain, Laxmi Publication

Course outcomes:

After completing this course, the student will be able to –

- Understand the basic principles of design of R.C.C. structure.
- Design the section by **Limit State Method (LSM)**
- Use & Correlate the specifications of **IS: 875, IS 456 : 2000 & SP-16.**
- Draw and appreciate the proper reinforcement detailing of R.C. structural member and their connection using **SP-34 & IS 13920.**

Name of the Course: Diploma in Survey Engineering	
Course Title: Railway and Tunnel Survey	Course Code:SEPC303
Number of Credits: 2	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 2 hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 30 hrs.	End Semester Examination: 60 marks

Pre-requisites : Students should have knowledge of basic Surveying and Geometry.

Course Category : PC

Course Objective

On successful completion of the course the students will be able to:

- Components of the railway
- Alignment of railway
- Working procedure of tunnel layout and alignment.
- Construction survey of different types of tunnels.

Unit	Course Content	Hour/Unit	Marks
Unit 1	<p>Introduction:</p> <p>Railway as a mode of land transport, Classification of Indian Railways, zones of Indian Railway,</p> <p>Alignment- Factors governing rail alignment</p> <p>Rail Gauges – types, factors affecting selection of gauge, advantages of uniform gauge; Rail track cross sections – a standard cross-section of BG & M.G; Single & double line in cutting and embankment.</p> <p>Function and requirements of Rails, Sleeper, and Ballast.</p>	6	10
Unit 2	<p>Railway Track Geometrics:</p> <p>Gradient & its types, grade compensation on curves(problems)</p> <p>Superelevation – governing formula, limits of Superelevation on curves</p> <p>Cant deficiency, cant excess, and negative cant (along their permissible value), realignment of curves by string line method</p>	9	20

Unit 3	<p>Tunnel Layout and Alignment:</p> <p>Introduction to Tunnel Survey. Types of Tunnels based on Purpose, Geological location &, and Cross-sectional shapes.</p> <p>Clearance, Alignment, and Grades for Highway & Railway tunnels.</p> <p>Utility Survey for Tunneling, Route mapping, Survey control networks, and Settlement monitoring.</p> <p>Horizontal and vertical alignment, Tunnel Guidance and Wriggle Survey.No numerical Problems.</p>	6	10
Unit 4	<p>Tunnel Construction Survey:</p> <p>Triangulation in Tunnel</p> <p>Surface Survey for a tunnel. Fixing shafts in an underground- i) Straight Tunnel, ii) Curved Tunnel</p> <p>Construction survey i) Straight Tunnel, ii) Curved Tunnel &, iii) Sloping TunnelSimple Numerical problems.</p>	9	20
Total		30	60

Suggested learning resources:

- A Text Book of Railway Engineering by S.C. Saxena, Dhanpatrai& sons
- Railway Engineering by Chandra and Agarwal, Oxford
- Surveying (Vol-II) by Dr. K. R. Arora, Standard Book House
- Tunnel Engineering Hand Book by John O. Bickel, Thomas R. Kuesel, Elwyn H. King, Kluwer Academic Publishers
- Introduction to Tunnel Construction by David Chapman, Nicole Metje, and Alfred Stark, Spon Press

Course outcomes: After completing this course, the student will be able to –

- Know the component of railway
- Understand methods of survey and investigation of alignment of the railway
- Learn the basic idea of tunnel survey, tunnel layout, and alignment.
- Applythe basic survey concept to solve various problems during the construction of shafts in an underground tunnel and the construction of straight, curved, and sloping tunnels.

Name of the Course: Diploma in Survey Engineering	
Course Title: Advanced Survey	Course Code:SEPC305
Number of Credits: 2	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 2 hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 30 hrs.	End Semester Examination: 60 marks

Pre-requisites : Students should have knowledge of basic Surveying and Remote Sensing.

Course Category : PC

Course Objective

On successful completion of the course the students will be able to:

- Application of various modern survey instruments required in the field of advanced survey.
- Calculation of various field survey data using Electronic Distance Measurement &, Total Station.
- Working procedure and application of Global Positioning System &, Differential Global Positioning System in the field of advanced survey.
- Working procedure and application of Geographical Information System in the field of advanced surveying.
- Cartography and application of Cartography in map production.
- General features of a map and various map projection &, coordinate systems.
- Application of Remote Sensing, GPS & GIS in advanced computer-aided Cartography in digital map production, map reproduction, and map analysis.

Unit	Course Content	Hour/Unit	Marks
Unit 1	<p>Electronic distance measurement (EDM) &, Total Station (TS)</p> <p>Introduction to EDM.</p> <p>The basic concept of Electromagnetic waves. Basic Definition: Cycle, Wavelength, Frequency, Period, and Phase of the wave.</p> <p>Computing the distance from transit time and phase difference.</p> <p>Total Station: Basic components & Features, Setting-up and orienting a total station, Functional operations. Uses and limitations of Total Station.</p>	6	15
Unit 2	<p>Global Positioning System (GPS) &, Differential Global</p>	6	15

	<p>Positioning System (DGPS):</p> <p>The basic concept of GPS. Different segments. Operational procedures, Sources of error in GPS.</p> <p>Principle of DGPS, Applications, and limitation of GPS and DGPS.</p>		
Unit 3	<p>GIS (Geographical Information System)</p> <p>Introduction to GIS. Subsystems of GIS, GIS Hardware & Software, Spatial Data, Attribute Data, Representation of data, Raster and Vector Data Structure, Conversion between Vector and Raster.</p> <p>Sources of errors in GIS, Applications of GIS.</p>	6	15
Unit 4	<p>Cartography</p> <p>Introduction to Cartography, Nature, and scope of Cartography.</p> <p>Types of Maps, Elements, and Utility of map, Symbols used in the map, Numbering of Survey of India Topo sheets.</p> <p>Introduction to Map Projection, Basis of map projections, Scale and Scale Factor.</p> <p>Simple Equidistant Projections: Cylindrical, Conical, and, Azimuthal Projection. Polyconic projection, UTM projection. Geographic and UTM coordinates, datum, WGS-84.system.</p> <p>Introduction to Computer-aided Cartography. Role of Remote Sensing (RS), GPS & GIS in digital map production, map reproduction, and map analysis.</p>	12	15
Total		30	60

Suggested learning resources:

- Surveying (Vol-III) by Dr. K. R. Arora, Standard Book House
- Surveying (Vol-I & II) by S. K. Duggal, McGraw Hill Education
- Remote Sensing and GIS by Basudeb Bhatta, Oxford university press
- Fundamentals of Cartography by R. P. Mishra, Concept Publishing
- Advanced Surveying by SatheeshGopi, R. Sathikumar, N. Madhu, Pearson
- Concepts and Techniques of Geographic Information Systems by C. P. Lo, Albert K. W. Yeung, Pearson

Course outcomes: After completing this course, the student will be able to –

- Use the knowledge of Electronic Distance Measurement and Total Station in the field of advanced survey.
- Apply the knowledge of GPS & DGPS to calculate necessary survey data.
- Learn the basic features of GIS and its application in the advanced survey field.
- Understand the basic concept of Cartography and its uses.
- Choice of proper Map Projection technique and Coordinate System.
- Apply the concept of Remote Sensing, GPS, and GIS in advanced computer-based Cartography

Name of the Course: Diploma in Survey Engineering	
Course Title: Route Survey	Course Code:SEPC307
Number of Credits: 2	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 2 hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 30 hrs.	End Semester Examination: 60 marks

Pre-requisites : Students should have knowledge of Surveying and the mode of transportation used.

Course Category : PC

Course Objective

On successful completion of the course the students will be able to:

- Understand the interactions between transportation planning and land use planning, economics, social planning, and master plans.
- Gain the facility of utilizing state-of-the-art techniques and models in the field.
- Have the capability to identify and solve transportation problems within the context of data availability and limitations of analysis tools.

Unit	Course Content	Hour/Unit	Marks
Unit 1	Necessity and components of Transportation System: Role of transportation in the development of the nation, Modes of the transportation system – roads, railways, airways, waterways, other modes of transport, Importance of each mode, comparison and their relative merits and demerits.	3	4
Unit 2	Highway Development and Planning: Highway Development in India- Jayakar Committee and the Recommendation, Indian Road Congress, Nagpur Road Conference; Necessity of Highway Planning, Classification of Road- Type of road, methods of classification of Road, Classification of road based on Nagpur Road Plan, Urban road classification, Road Pattern	5	10
Unit 3	Highway Alignment and Surveys: Highway alignment, and its requirements, factors controlling the alignment, Engineering Survey for highway	14	30

	<p>locations- Map study, reconnaissance, Preliminary Survey, Detailed Survey; Drawing, and Report.</p> <p>Highway Geometric Design: Importance of geometric design, Design controlling criteria, Highway cross-sectional element-short description of Pavement surface characteristic, Camber, simple problems, Carriageway, Kerbs, Shoulders, Width of Roadway, right of way, Typical cross-sections of roads; Sight Distance, Different types of sight distance, Stopping sight distance, Overtaking Sight Distance, Simple problems related to sight distance; Design of Horizontal Alignment- Design speed, Horizontal curve, Super elevation, maximum and Minimum superelevation, design superelevation, Simple problems.</p>		
Unit 4	<p>Highway material: Significance of Subgrade, Characteristic of soil and desirable properties, CBR Test, Test on road aggregates: Crushing, Abrasion Test and Impact Test; Bituminous materials: Test of Bitumen: penetration Test, Ductility Test.</p>	4	8
Unit 5	<p>Type of Highway Pavement: Object of pavement, Types of Pavement, Rigid and flexible pavements, differences,</p> <p>Highway Construction: Type of highway Construction- Short description of water-bound macadam road, Different types of bituminous road- Short description of Bituminous Macadam, and bituminous carpet.</p>	4	8
Total		30	60

Suggested Learning Resources:

- Highway Engineering by Khanna& Justo, Khanna Publication
- Traffic Engineering by L.R. Kadiyali
- Transportation Engineering by N.L. Arora, S.P. Luthara, I.P.H. New Delhi

Course Outcomes: After completing this course, the student will be able to –

- Understand the interactions between transportation planning and land use planning, economics, social planning, and master plans.
- Solve transportation-related problems and able to design the same.
- Identify the suitable material and types of pavement to be chosen for the highway project.

Name of the Course: Diploma in Survey Engineering	
Course Title: Municipal Engineering	Course Code: SEPE301/1
Number of Credits: 3	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 3 hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 45 hrs.	End Semester Examination: 60 marks

Pre-requisites : Students should know pollutants and their effects on construction and the environment Course

Category : PE

Course Objective On successful completion of the course the students will be able to:

- Resources of water and pollutants of water
- Sanitation System

Unit	Course Content	Hour/Unit	Marks
Unit 1	<p>ENVIRONMENTAL STUDY</p> <p>Water supply from wells, tube wells, surface intake, determination of yield, per capita demand.</p> <p>Quality of water: Water analysis, physical test, chemical test, living organism in water, Biological tests.</p>	10	10
Unit 2	<p>PURIFICATION OF WATER</p> <p>Plain sedimentation., Sedimentation with coagulation Filtration, Disinfections, Softening, and other miscellaneous methods</p> <p>Water distribution systems and Networks</p>	20	30
Unit 3	<p>SYSTEM OF SANITATION</p> <p>Methods of collection, conservancy system, water carriage systems, merits and demerits of conservancy and water carriage systems.</p> <p>Sewer appurtenances</p> <p>Microbiology of sewerage</p> <p>Sewage treatment methods: Preliminary process, Biological</p>	15	20

	process. Solid waste collection and disposal methods. Air pollution: sample survey and analysis		
Total		45	60

Suggested learning resources:

- Environmental Engineering by Santhosh Kumar Garg, Khanna Publication
- Environmental Engineering by A.Kamla.& D. L. Kanth Rao, Tata McGraw Hill,
- Transportation Engineering by N.L. Arora, S.P. Luthara, I.P.H. New Delhi

Course outcomes:

After completing this course, the student will be able to –

- Understand the resources of water and pollutants of water
- Understand Sanitation System

Name of the Course: Diploma in Survey Engineering	
Course Title: Water Resource Engineering	Course Code: SEPE301/2
Number of Credits: 3	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 3hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 45hrs	End Semester Examination: 60 marks

Pre-requisites : Students should have the knowledge of morphological nature of the land.

Course Category : PE

Course Objective On successful completion of the course the students will be able to:

- Resources of water.
- Hydrological Cycle
- Groundwater resources

Unit	Course Content	Hour/Unit	Marks
Unit 1	INTRODUCTION Water resources – world water inventory - Importance of water resources - Necessity for conservation and development of water resources – water resources of India	5	5
Unit 2	HYDROLOGY Introduction – Definition -Application of Hydrology in engineering -Hydrological cycle –Precipitation-Measurements of rainfall - Rain gauge- Types of rain gauges(names only), – Rain gauge network –Radar and Satellite Measurements of rainfall - Runoff - Estimation of runoff - losses – Hydrograph – Unit Hydrograph – Uses	20	30
Unit 3	GROUNDWATER Groundwater resources- zones of Ground water-Aquifer - types- terms used –porosity, permeability, yield, specific yield, specific retention, coefficient of storage, specific capacity – Darcy’s law measurement of yield of well - pumping test- recuperation test-ground water exploration	15	20
Unit 4	FLOOD	5	5

	Introduction, the definition of flood, causes of flood, effects of the flood. Flood control, Flood forecasting, flood control in India.		
Total		30	60

Suggested Learning Resources

- Hydrology and water resources engineering by Santhosh Kumar Garg, Khanna Publishers.
- Irrigation Water Resources Water Power by P.N. Modi, Standard Book House
- Irrigation and Water Resources Engineering by G.L.Asawa, New Age International(P) Ltd. publishers, New Delhi.
- Engineering Hydrology by K.Subramany, Tata Mc Hill

Course outcomes:

After completing this course, the student will be able to –

- Understand the water resource potential in India and the need for water resource management
- Understand the components of the hydrological cycle and hydrograph.

Name of the Course: Diploma in Survey Engineering	
Course Title: Design of Steel Structure	Course Code: SEPE301/3
Number of Credits: 3	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 3hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 45hrs	End Semester Examination: 60 marks

Pre-requisites : Students should have the knowledge of the strength of the material and basic knowledge of Engineering Mechanics and building materials

Course Category : PE

Course Objective On successful completion of the course the students will be able to:

- To analyze the steel structure and its members for determining the forces acting in the member.
- To Calculate the design concept of different structural components using IS 875 Part 1, 2 & 3 provisions for dead load, live load, and wind load.
- Design the tension member, compression member, beam, purlin, and column bases and their connection.

Unit	Course Content	Hour/Unit	Marks
Unit 1	<p>Introduction: Advantages and disadvantages of steel as a structural material. Types of sections, Grades of steel (IS 2062), and Stress-strain characteristics of mild steel; Types of loads on steel structure and Rolled steel sections. Geometrical properties of gross and effective cross sections and other properties as per IS:800-2007.</p> <p>Plastic Analysis: Idealized stress-strain curve for Structural Steel– Requirements and Assumptions of Plastic method of analysis, Plastic Moment of Resistance and Plastic section Modulus Shape Factors of rectangular/circular, Collapse load</p> <p>Limit State Design: Basis for design– Classification of Limit States– Characteristic and Design Actions– Limit states of strength and serviceability, Partial Safety Factors for Loads and Materials– Design criteria</p>	10	12
Unit 2	Design Of Connections And Detailing: Types of connections– Bolted, Riveted, and Welded connections,	15	20

	<p>Basic requirements of connections, Clearance for holes, Minimum and Maximum spacing of fasteners, Minimum edge/ end distances, Requirements of Tacking fasteners. '</p> <p>Bolted Connection: Types of bolts, Bearing type Bolted joint, Nominal and Design shear strengths of bolts, Reduction factors for Long joints, Large grip lengths, Thick packing plates;</p> <p>Nominal and Design bearing strengths of bolts, Reduction factors for oversized and slotted holes, Nominal and Design tensile strengths (tension capacity) of bolts, Simple problem.</p> <p>Welded Connection: Types of welds, Fillet welds, Minimum and maximum sizes, Effective length of weld, Fillet welds on inclined faces, Design strengths of shop/site welds; Butt welds, Effective throat thickness and effective length of butt weld, Simple problems</p>		
Unit 3	<p>Design of Tension Members (L.S.M): Type of Tension Members, Net sectional, and Effective net Area of tension members - Design Strength of Tension members against yielding of gross section requirements, against rupture of the critical section and due to block shear. Problems on the determination of design strength of given members and designing tension members using rolled steel sections for given loads– Design of bolted and welded connections for tension members –simple Problems.</p> <p>Design of Compression Members(L.S.M): Effective Length and Effective Sectional Area of Compression members; Design Stress and design strength, Buckling Class of cross sections, Imperfection factor, Stress reduction factor, Thickness of elements, Analysis and design of axially loaded column. Introduction to lacing and battening (No numerical problem on Lacing and Battening)</p>	12	20
Unit 4	<p>Design of Flexural Members(L.S.M): General design concept of the beam, Effective span of Beams, Design strength of bending (Flexure), Limiting deflection of beams, Design of laterally supported Simple beams for Bending moment and Shear force using single rolled steel sections- low shear case only (symmetrical cross sections only) – simple Problems.</p>	8	8
Total		45	60

Suggested Learning Resources

- Steel Structure by Dr. N. Subramanian, Oxford University Press.
- Limit State Design in Structural Steel by M.R. Shiyekar, PHI Learning Pvt. Ltd,

- Limit State Design of Steel Structures by S. K. Duggal, TataMcGraw-Hill.

Course outcomes: After completing this course, the student will be able to –

- Understand the basic structural behavior of components of a building upon different combinations of structural loading.
- Evaluate the connection design of different structural components.
- Design the tension and compression members for steel structures.
- Calculate the flexure strength of members using Indian standard code provision for steel design.

Name of the Course: Diploma in Survey Engineering	
Course Title: Irrigation Engineering	Course Code: SEPE303/1
Number of Credits: 3	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 3hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 45hrs	End Semester Examination: 60 marks

Pre-requisites : Students should have the knowledge of morphological nature of the land.

Course Category : PE

Course Objective On successful completion of the course the students will be able to:

- Irrigation system of India
- Production of different crops in India
- Canal irrigation of India

Unit	Course Content	Hour/Unit	Marks
Unit 1	<p>INTRODUCTION</p> <p>Definition of Irrigation, Necessity of Irrigation in India, Advantages and Disadvantages of irrigation, Types of irrigation.</p>	5	10
Unit 2	<p>WATER REQUIREMENT OF CROPS</p> <p>Cropping seasons and crops in West Bengal. Definition – Crop period, base period, Duty, Delta, factors affecting Duty, relation between Duty, Delta and base period, CCA,GCA,IA, Time Factor, Crop seasons and Indian Agriculture, Irrigation Efficiencies.</p>	20	30
Unit 3	<p>DISTRIBUTION WORKS</p> <p>Irrigation Canal - Typical cross section of canal - components of canal section - classification of canal - alignment of canal - canal head works –types - components of diversion head works - cross drainage works –types - canal losses - lining of canal – necessity - types of lining.</p>	20	20

Total	30	60
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Suggested Learning Resources

- Hydrology and water resources engineering by Santhosh Kumar Garg, Khanna Publishers.
- Irrigation Water Resources Water Power by P.N. Modi, Standard Book House
- Irrigation and Water Resources Engineering by G.L.Asawa, New Age International(P) Ltd. publishers, New Delhi.

Course outcomes:

After completing this course, the student will be able to –

- Understand irrigation system of India
- Understand production of different crops in India
- Understand the distribution system of canals and management of canal irrigation.

Name of the Course: Diploma in Survey Engineering	
Course Title: Construction Management	Course Code: SEPE303/2
Number of Credits: 3	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 3hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 45hrs	End Semester Examination: 60 marks

Pre-requisites : Students should have knowledge of construction projects and construction materials

Course Category : PE

Course Objective On successful completion of the course the students will be able to:

- Prepare students to be effective team members in a construction organization setup.
- Managerial skills in managing materials, time, and human resources.
- Concepts of disasters and explore manmade disasters at the national as well as international levels with quality measuring indices and vulnerability atlas of India.
- Prepare suitable techniques for proper scheduling of construction projects.

Unit	Course Content	Hour/Unit	Marks
Unit 1	Introduction: Definition of Construction Management(CM), aims and objectives of construction management. Benefits of CM; Roles, The construction team components- owner, Engineer, Architect, Contractor-their functions and Interrelationship and jurisdiction. ; Resources for construction management-men, machines, materials, money	8	10
Unit 2	Contract Management: Definition of contract; Types of contract system; Components of contract documents; Floating of Tender; Steps involved in the award of the contract; Execution and Monitoring of contract documents. Construction organization: Organization Structure & types; Concept of hierarchy; Communication within the hierarchy; Payroll & Records.	8	15
Unit3	Resource Management: Definition – Need for resource management – Optimum utilization of resources- finance, materials, machinery, human resources – Resource planning – Resource leveling and its objectives Infrastructure Management: Explanation of site layout;	9	10

	Approach road; Provision of water connection, electricity connection, establishing communication system, drainage system; Provision for site office, workshop, warehouse, security room.		
Unit 4	<p>Planning and scheduling techniques: Bar charts and linked Bar charts, Network analysis and Critical Path Method(CPM), PERT(Program Evaluation and Review Technique), Advantages and disadvantages of CPM & PERT. Simple problems</p> <p>Cost Management: Control estimate. Direct cost, Indirect cost, Contingency, and cost-volume relationship.</p>	20	25
Total		45	60

Suggested Learning Resources

- Construction project management –theory and practice by Neeraj Kumar Jha, Pearson Publication
- Project Planning and control with PERT and CPM by B C Punmia, Laxmi Publications
- Construction Management and Planning by B. Sengupta, &H.Guha, Tata McGraw Hill Publishing Company Ltd., New Delhi
- Construction planning and management by PS Gahlot& B M Dhir, New Age International Publishers

Course outcomes: After completing this course, the student will be able to –

- Develop schedules for the construction project. social planning and master plans.
- Explain the important terminology related to materials, site, equipment, and labor management.
- Apply to schedule of construction techniques of PERT and CPM.
- Apply methods to measure and monitor the progress of construction work.

Name of the Course: Diploma in Survey Engineering	
Course Title: Landscape Design	Course Code: SEPE303/3
Number of Credits: 3	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: 3hours/ week	Continuous internal Assessment: 20 Marks
Tutorial: Nil	Attendance: 10 Marks
Practical: Nil	Assignment/ Presentation/ Quiz: 10 Marks
Total Contact Hours: 45hrs	End Semester Examination: 60 marks

Pre-requisites : Students should have the knowledge of drawing and sketching

Course Category : PE

Course Objective On successful completion of the course the students will be able to:

- The importance and role of Surveying in Landscape Design
- The basic guidelines of Landscaping.
- The site planning concerning landscaping.
- Different natural and manmade elements of Landscaping

Unit	Course Content	Hour/Unit	Marks
Unit 1	Introduction, Principles Of Landscaping Definition of Landscaping. Role of Survey in landscaping and architecture. Evolution of Landscaping: Oriental and Occidental. Relationship of man, building, and landscaping. Elements of landscaping.	3	4
Unit 2	Garden Patterns Historical Garden Patterns-Oriental: Mughal & Japanese, Occidental: French & Renaissance. Modern Garden Patterns: Rock Garden, Indoor Garden, Terrace Garden.	7	7
Unit3	Guidelines For Landscaping Residential: Individual and group of buildings. Commercial: Shopping Mall. Recreational: Parks and Play Areas. Public Spaces: Plaza and Squares.	12	17
Unit 4	Site Planning Need, Definition, and Scope for site planning. Relationship between site planning and landscaping. Layout and maintenance of drainage.	8	12

	Layout and standards of road and pedestrian paths.		
Unit 5	Natural Elements Of Landscaping Rock&Landform, Water, Plants: Different types of trees, shrubs, ground covers, and climbers with their characteristics mentioning the basis of their selection for different purposes.	7	8
Unit 6	Manmade Elements Of Landscaping Materials, construction details, and maintenance of the following manmade elements of landscaping: Outdoor Furniture, Outdoor Light Fixtures, Signage & Signboard, Sculpture, Fences Paving: Hard and soft paving, Layout for formal and informal paving, Different kinds of paving materials: soil, stabilized murrum, brick & stone. Artificial Rock, Artificial Waterfall	8	12
Total		45	60

Suggested learning resources:

- Designs on the Landscape by R. A. Preece, CBS Publishers
- Landscape Detailing (Vol.- I & II) by Michael Littlewood, CBS Publishers
- Time-Saver Standards for Landscape Architecture by Charles W. Harries, Nicholas T. Dines, McGraw Hill
- Landscape Architect's Portable Handbook by Nicholas T. Dines, Kyle D. Brown, McGraw Hill
- Landscape for living by Garrett Eckbo, F.W. Dodge Corp.
- Landscape Architecture by J. O. Simonds, McGraw Hill
- Basic Elements of Landscape Architectural Design by Norman K. Booth, Waveland Press
- Foundations of Landscape Architecture by Norman K. Booth, Wiley

Course outcomes: After completing this course, the student will be able to –

- Apply the knowledge of Surveying in Landscape Design
- Follow the guidelines for landscaping residential areas, commercial areas, parks, play areas, plazas & squares.
- Understand the site planning and its scope in Landscape Design.
- Understand the application of natural and manmade elements in Landscape Design.

Name of the Course: Diploma in Survey Engineering	
Course Title: Field Survey Practice-III	Course Code: SEPC309
Number of Credits: 3	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: Nil	Continuous Internal Assessment: 60 Marks
Tutorial: 6 Classes/Weeks	
Practical: Nil	
Total Contact Hours: 90 hrs.	End Semester Examination: 40 marks

Pre-requisites : Perfection in drawing and sketching. Students should have basic knowledge of Surveying and the operation of basic surveying instruments.

Course Category : PC

Course Objective On successful completion of the course the students will be able to:

- Identify and use different survey instruments.
- Record and observe necessary observations with the survey instruments.
- Compute necessary survey data from field observation for preparation of drawing etc.
- Prepare report including drawing using survey data collected in the field.

Instructions:

- Group size for survey practical work should be formed in such a way that each student from a group can handle instruments independently to understand the functions of different components of the instrument.
- Drawing and plotting should be considered as part of practical work.
- Term work shall consist of the record of all practicals and projects in the field book and drawing of Project work on full/half imperial size drawing sheets.

Sl. No.	Assignments/Practical
1	Survey with total station
2	Comparative map and boundary demarcation
3	Cross section of a river
4	Survey with GPS (If possible DGPS may be used)

Course outcomes: After completing this course, the student will be able to –

- Perform survey using Total Station
- Perform survey using GPS

Name of the Course: Diploma in Survey Engineering	
Course Title: Quantity Survey	Course Code: SEPC311
Number of Credits: 1	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: Nil	Continuous Internal Assessment: 60 Marks
Tutorial: Nil	
Practical: 2 Classes/ week	
Total Contact Hours: 30 hrs.	End Semester Examination: 40 marks

Pre-requisites : Basic knowledge of estimation, costing, construction methodology, and building materials

Course Category : PC

COURSE OBJECTIVES On successful completion of the course the students will be able to:

- Estimate the quantities of building materials.
- Estimate the quantities of road materials.
- Estimate earthwork

Sl. No.	Assignments/Practical
1	Quantity estimate of a symmetrical and asymmetrical boundary wall.
2	Quantity estimate of underground masonry water tank
3	Quantity estimate of a single storied building
4	Quantity estimate of earthwork for 1 km road.
5	Quantity estimate of a masonry surface drain of 50 m length.

Course outcomes:

After completing this course, the student will be able to –

- Estimate the quantities of Building materials.
- Estimate the quantities of road materials.
- Estimate earthwork

Name of the Course: Diploma in Survey Engineering	
Course Title: Internship-II	Course Code: SI301
Number of Credits: 1	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: Nil	Maximum Marks: 100
Theory: Nil	Continuous Internal Assessment: 100
Tutorial: Nil	
Practical: Nil	
Total Contact Hours: Nil	End Semester Examination: Nil

Pre-requisites : Students should know about basic surveying with drawing and sketching and computer-aided drafting skills.

Course Category : SI

COURSE OBJECTIVES

On successful completion of the course the students will be able to:

- Manifest the potentiality of good communication and professional skill.
- Relate and understand the connection between academic and industrial working fields.
- Understand the latest research and development in today's industrial world.
- Develop the power to represent own observation through the arrangement of report &
- Seminar using the data collected and recorded from the training.

Instructions :

- The students are required to be involved to undergo internships with Industry/NGOs/ Government Organizations/ Micro/Small/ Medium enterprises to make themselves ready for industry.
- Train and Placement cells and concerned teachers have to take initiative for coordination.
- Online internship options may be explored.

Unit No	Content:
Unit 1	After completion of the internship, the student should prepare a comprehensive report, indicating what he/ she has observed and learned in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/ TPO for assigning topics and problems and should prepare the final report on the assigned topics. The training report should be signed by the Industrial Supervisor/ Internship Faculty Mentor and TPO and HOD.
Unit 2	After completion of each internship, the student should prepare for seminars based on his/ her Internship report which is to be represented before an internal committee constituted by the concerned department of the institute.

Course outcomes:

After completing this course, the student will be able to –

- Understand the practical scenario and problems of the Industry.
- Understand the practical use of theoretical knowledge in industrial fields.
- Learn how to cope with the demands of modern industry.
- Learn how to record, take notes and represent your observations before others to understand them.
- Develop good communication and professional skill.

Name of the Course: Diploma in Survey Engineering	
Course Title: Major Project	Course Code: PR301
Number of Credits: 1	Semester: Fifth
Teaching Scheme	Examination/Scheme
Duration: 15 weeks	Maximum Marks: 100
Theory: Nil	Continuous Internal Assessment: 60 Marks
Tutorial: Nil	
Practical: 2 Classes/ week	
Total Contact Hours: 30 hrs.	End Semester Examination: 40 marks

Pre-requisites : Students should have knowledge of basic surveying with drawing and sketching.

Course Category : PR

COURSE OBJECTIVES

On successful completion of the course the students will be able to:

- Understand the procedures and different measurements to be taken in a road project.
- Compute necessary survey data from field observation for preparation of road alignments and profiles.
- Prepare report including drawing using survey data collected in the field.
- Enhance knowledge to represent the surveyed data.

Sl. No.	Assignments/Practical
1	<p>Field Survey Works of the Road Project (Survey work should be not less than 1 km):</p> <p>1.1 Making the tentative alignment 1.2 Reconnaissance survey, Preliminary location survey &, and Final location survey 1.3 Preparation of compass survey map. 1.4 Fly Levelling, Profile Levelling (Longitudinal leveling), Cross-sectional Levelling 1.5 Plotting of profile (Longitudinal section) and Plotting of Cross-sections. 1.6 Working Profile: Calculation of Formation levels. 1.7 Colour convention 1.8 Curve Design 1.9 Computation of volume of earthwork, Preparation of Mass haul diagram</p>
2	<p>Preparation of the Project Report: The report prepared should include information related to the following: -</p> <p>2.1 Introduction to the project 2.2 Necessity and background of the project 2.3 Socio-economic survey and rainfall data/record of High Flood Level (HFL) of the area 2.4 Justification for selection of the final alignment 2.5 Rough cost estimation of the proposed road: Earthwork, Road surface, Drainage, etc. 2.6 Brief specification with a rough cost estimate of the project 2.7 Overall benefit of the project 2.8 Conclusion and recommendation</p>

3	Maps and drawings should be Submitted Along with the Project Report: 3.1 General map of the area through which the proposed road will pass. 3.2 Route map/key plan. 3.3 Longitudinal profile and cross-sections of the proposed road. 3.4 Sketch plan of curve detail. 3.5 Mass haul diagram.
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Suggested learning resources

Surveying and Levelling (Vol. 1 &, 2) by S. K. Duggal, TATA Mc GRAW-HILL

- Surveying (Vol. 1 &, 2) by Dr. K. R. Arora, STANDARD BOOK HOUSE
- Surveying and Levelling by N. N. Basak, TATA Mc GRAW-HILL
- Surveying and Levelling (Vol. 1 &, 2) by Dr. B. C. Punmia, Laxmi Publication

Course outcomes:

After completing this course, the student will be able to –

- Grow the knowledge in the preparation of a project report.
- Learn the procedures of the Socio-economic survey.
- Measure and record the necessary survey data required for road construction.
- Draw the longitudinal profiles and cross-sections of a proposed road.
- Set out the constructional layout of a proposed road.