

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



Syllabus  
of

Diploma in Survey Engineering [SE]

Part-III (6<sup>th</sup> Semester)

2023

### 6TH SEMESTER

SL NO	CODE	COURSE TITLE	CRED IT	CLASS/WK			EXAMINATION SCHEME						
				L	T	P	INTERNAL			ESE	PIA	PEA	TOTAL
							INT	AS/QZ	ATD				
1	SEPC302	Transmission Line Survey	3	3	-	-	20	10	10	60	-	-	100
2	HU302	Entrepreneurship and Start-up	3	2	1	-	20	10	10	60	-	-	100
3	SEPE302	Program Elective-IV	3	3	-	-	20	10	10	60	-	-	100
4	SEOE302	Open Elective -I	3	3	-	-	20	10	10	60	-	-	100
5	SEOE304	Open Elective -II	3	3	-	-	20	10	10	60	-	-	100
6	SESE302	Seminar	1	-	-	2	-	-	-	-	60	40	100
7	PR302	Major Project	3	-	-	6	-	-	-	-	60	40	100
8	SEPC304	Survey Training Camp	2	-	-	4	-	-	-	-	60	40	100
<b>TOTAL</b>			<b>21</b>	<b>14</b>	<b>1</b>	<b>12</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>800</b>

**SEPE 302 :Any one of the three subjects 1.Building Planning and Drawing,2.Construction Safety,3.Township Planning.**

**SEOE302: 1.Engineering Economics and Project Management**

**SEOE304: Anyone of the three subjects 1.Disaster Management, 2.Industrial Management, 3.Environmental Science and Engineering.**

**Student contact hours per week:27 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.**

<b>Name of the Course: Diploma in Survey Engineering</b>	
Course Title: <b>Transmission Line Survey</b>	CourseCode:SEPC302
Number of Credits:3	Semester: Sixth
<b>Teaching Scheme</b>	<b>Examination/Scheme</b>
Duration:15weeks	MaximumMarks:100
Theory:3hours/ week	Continuous internal Assessment (INT):20Marks
Tutorial:Nil	Assignment/ Presentation/ Quiz (AS/QZ): 10 Marks
Practical:Nil	Attendance (ATD): 10 Marks
Total Contact Hours: 45hrs.	End Semester Examination (ESE):60 Marks

Pre-requisites : Students should have the knowledge of basic Surveying, and basic computer applications

Course Category : PC

Course Objective

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

- Understand the process of Preliminary and Detailed Survey required in Transmission Line
- Know the uses the Modern Survey Instruments like Total Station, GPS, DGPS in Transmission Line Survey
- Know the uses of Survey of India Topo Map, Satellite Images, UTM Coordinates, PLSCADD Software in Transmission Line Survey

Unit	Course Content	Hours/Unit	Marks
<b>Unit1</b>	<p><b>Introduction to Transmission Line Towers</b></p> <p>1.1 General concept on Overhead &amp; Underground Power Transmission, Transmission Line Planning</p> <p>1.2 Basic Concept of High Voltage Transmission Line, Concept of a Tower, Types and Shapes of Transmission Line Towers, Configuration &amp;, Geometry of Tower, Height of a Tower, Tower parts and various type of Insulators</p> <p>1.3 The different voltages for Power Transmission, Ground Clearance for various voltages</p>	7	8
<b>Unit2</b>	<p><b>Preliminary Survey of Transmission Lines</b></p> <p>2.1 Concept of Topo Sheet (1:50000, 1:250000) &amp; its Definitions, Survey of India Topo Map Numbering, UTM Zones, UTM Co-ordinates</p>	16	20

	<p>2.2 Parts of work &amp; Accuracy order of Survey, Skills required for Overhead Power Transmission Line Surveyor</p> <p>2.3 Beeline and Route Alignment, Reconnaissance survey, Walk Over Survey, Preliminary Survey field work, Way leave &amp; Right of Way</p> <p>2.4 General Points for Route Selection, Concept of various Crossing – River, Forest, Railway, Power Transmission Line, Communication Line, NH/SH Road Crossing, Provisions of route selection near Aerodromes, Radar Stations, Rifle Ranges and Helipads</p> <p>2.5 Various instruments used in Survey (Theodolite, Auto Level, Total Station, GPS, DGPS, Smart Station etc.) &amp;, their accuracies</p> <p>2.6 Requirement of Transmission Line Routing, Usage of modern technologies (Satellite Images, Survey of India Topo Map, Aerial Photogrammetry, LiDAR) for Identification of Alternative routes, Route Alignment, Marking &amp; Report Making and recommendation for final route.</p>		
<b>Unit 3</b>	<p><b>Detailed Survey of Transmission Lines</b></p> <p>3.1 General concept of Detailed Survey, Collection of Detailed Survey Data, Profiling, Wind Span, Weight Span, Ruling Span</p> <p>3.2 Preparation of Tower Spotting Data with necessary details</p> <p>3.3 Locating the Takeoff Tower near Sub Stations</p> <p>3.4 Manual Tower Spotting using Sag Templates, Sag Profiles.</p> <p>3.5 Application of PLSCADD for optimum Tower Spotting, Minimum Clearance from Ground- Building etc.</p> <p>3.6 Preparation of Tower Schedule, Land Schedule &amp; ROW, Trial Pits, Soil Resistivity Data</p> <p>3.7 Preparation of Detailed Survey Report, Check Survey, Check Survey Report</p>	12	17
<b>Unit 4</b>	<p><b>General Knowledge of Foundation Works- Excavation &amp; Stub-Setting and Safety in TL Survey</b></p> <p>4.1 Types of Loads on Foundation, Classification of Soils, Types of Foundation &amp; Selection of Foundation, Preparation of Foundation site, type of foundation to be adopted, Pit Marking, Excavation &amp; Orientation of Towers, Uses of Stubs for Foundation</p> <p>4.2 General Safety Precautions, Safety measures during Field Survey Work, Route Clearance, Excavation and Foundation Works, System Stability &amp; Environmental issues in Power Transmission.</p>	10	15
<b>Total</b>		45	60

**Suggested learning resources:**

- Electrical Power Transmission Lines- by, T. Ch. Hanuman Rao, Dr. S. Majid Ali,  
Copies of the book can be obtained on request from- T. Ch. H. Rao, 9-222/2, Plot 257,  
Employees colony, Secunderabad 500 087
- Overhead Power Lines: Planning, Design, Construction by F. Kiessling, J. F. Nolasco, P. Nefzger, and U. Kaintzyk, Springer-Verlag Berlin Heidelberg publication.
- Transmission Line Manual, CBI&P panels of experts on Transmission lines, central board of irrigation and power, New Delhi
- Electric Power Generation, Transmission and Distribution- Leonard L. Grigsby
- Transmission and Distribution- electrical Engineering- Dr. C. R. Bayliss&, B. J. Hardy  
Newnes...Elsevier, Linacre House, Jordan Hill, Burlington, MA 01803, USA

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

1. Acquire introductory idea on transmission line towers, its nomenclature, geometry and configuration.
2. Learn the procedure to be followed during Preliminary and Detailed Survey of Transmission Lines.
3. Know the basic idea of foundation works required in Transmission Line Survey.
4. Enhance the knowledge of Safety to be followed in Transmission Line Surveying
5. Learn the uses of Survey of India Topo Map, Satellite Images, UTM Coordinates, PLSCADD Software in Transmission Line Survey.

<b>Name of the Course: Diploma in Survey Engineering</b>	
Course Title: <b>Building Planning and Drawing</b>	Course Code: SEPE302/1
Number of Credits: 3	Semester: Sixth
<b>Teaching Scheme</b>	<b>Examination/Scheme</b>
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 Civil engineering and design concept of basic engineering components

Course Category : PE

### Course Objective

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

- Understand the concept of the symbols, signs and conventions from the given drawing.
- Prepare line plans of residential using principles of planning.
- Prepare submission and working drawing for the given requirement of civil engineering structure.
- Understand the building by-laws related to residential building.

Unit	Course Content	Hour/Unit	Marks
Unit 1	<p><b>Conventions and Symbols:</b></p> <p>Conventions as per IS 962, symbols for different materials such as earthwork, brickwork, stonework, concrete, woodwork and glass. Graphical symbols for doors and windows, Abbreviations, Types of lines-visible lines, centre-line, hidden line, section line, dimension line, extension line, pointers, arrow head or dots. Appropriate size of lettering and numerals for titles, sub-titles, notes and dimensions. Sizes of various standard papers/sheets.</p>	8	10
Unit 2	<p><b>Principles of Planning of Building:</b></p> <p>Principles of planning for Residential and Public building- Aspect, Prospect, Orientation, Grouping, Privacy, Elegance, Flexibility, Circulation, Furniture requirements, Sanitation, Economy. Plot area, built up area, super built up area, plinth area, carpet area, floor area and FAR (Floor Area Ratio).</p> <p><b>Building By-laws:</b></p>	14	17

	Important by-laws related residential building, Minimum standard dimension, building permissions		
<b>Unit3</b>	<p><b>Type of Building:</b></p> <p>Type of Building based on occupancy based on NBC(part-IV):2005, Residential building, Educational building, Institutional building, Assembly building, Business Building, mercantile Building, Industrial building, storage building, Hazardous building ,Classification of Residential building as per NBC(part-IV):2005; Lodging, dwelling house, Dormitories, Apartment house, Hotels.</p> <p><b>Planning of Residential building:</b></p> <p>Planning of standard living room, Dining room, Bed room, Bath and water closet, Kitchen, Stair of residential building</p>	10	10
<b>Unit 4</b>	<p><b>Basic components of Building Elements:</b></p> <p>The basic concepts of building elements, Simple sectional view of different building components, Foundation, Purpose of foundation, Type of foundation, Selection of foundation, Masonry Wall, Classification of masonry wall, Brick masonry, Size and Shape of brick, Different types of bond, Stretcher, Header, English and Flemish bond, Door, part of Door, Window, Part of Windows, Planning and design of staircase- Rise and Tread for residential building, Flooring, Different type of flooring used in building. Load bearing structure, frame Structure, comparison of load bearing and frame structure.</p>	9	15
<b>Unit 5</b>	<p><b>Site selection of residential building :</b></p> <p>Topography of site, shape of site, nature of sub-soil, position of groundwater table, Facilities, availability of men and material, thing to be avoided near site.</p>	4	8
<b>Total</b>		<b>45</b>	<b>60</b>

**Suggested learning resources:**

- Bhavikatti.S.S. and Chitwadagi, M.V., Building Planning and Drawing, I.K. International Publishing House Pvt. Ltd.
- Shah. M.G. Kale, CM, Patki, S.Y., Building Drawing, Mcgraw Hill Publishing company Ltd. New Delhi.
- Malik and Mayo, Civil Engineering Drawing, Computech Publication Ltd New Asian Publishers, New Delhi.
- M. G. Shah and C. M. Kale, Principles of Perspective Drawing, Mcgraw Hill Publishing company Ltd. New Delhi.
- Swamy, Kumara; Rao, N, Kameshwara, A ., Building Planning and Drawing, CharotarPublication, Anand.
- Bhavikatti, S. S., Building Construction, Vikas Publication House Pvt. Ltd., New Delhi.

- Mantri, Sandip, A to Z Building Construction, Satya Prakashan, New Delhi.
- IS 962 and NBC(part-IV):2005

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

1. Interpret the symbols, signs and conventions from the given drawing.
2. Prepare line plans of residential buildings using principles of planning.
3. Prepare submission and working drawing for the given requirement of civil engineering structure.



<b>Name of the Course: Diploma in Survey Engineering</b>	
Course Title: <b>Construction Safety</b>	Course Code:SEPE302/2
Number of Credits:3	Semester: Sixth
<b>Teaching Scheme</b>	<b>Examination/Scheme</b>
Duration:15weeks	MaximumMarks:100
Theory:3hours/ week	Continuous internal Assessment (INT):20Marks
Tutorial:Nil	Assignment/ Presentation/ Quiz (AS/QZ): 10 Marks
Practical:Nil	Attendance (ATD): 10 Marks
Total Contact Hours: 45hrs.	End Semester Examination (ESE):60marks

Pre-requisites : Students should have the knowledge of construction work.

Course Category : PE

Course Objective

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

- Understand the importance of various safety guidelines of construction works.
- Understand various hazards occur in construction works.
- Find out the remedies to prevent various hazards which occur in construction works.

Unit	Course Content	Hour/Unit	Marks
<b>Unit1</b>	<b>Introduction:</b> History and Development of Safety Movement, Importance of Safety, Safety Policy: Safety Organization and its responsibilities. Physical, Physiological and Psychological factors of safety. Safety Education and Training.	5	10
<b>Unit2</b>	<b>Workplace hazards and its prevention methods:</b> <b>Fire Hazards:</b> Chemistry of Fire, Classification of Fire. Common Causes of Industrial Fire. Statutory Provisions regarding Fire Safety, Factors Contributing Towards Fire.  Determination of Fire Load. Fire Resistance of Building Materials. Design of Industrial Plant for Fire Safety. Prevention of Fire: Portable Extinguishers- Water Type Extinguisher, Carbon dioxide	15	15

	<p>Type Extinguisher, Foam Type Extinguisher, Dry Chemical Type Extinguisher. Sprinkle Systems, CO<sub>2</sub> Flooding System Foam Flooding System. Industrial Fire Detection and Alarms. Special Precautionary Measures in Handling/Processing Flammable Liquids, Gases, Vapours, Mists and Dusts. Emergency Action Plan.</p> <p><b>Construction Hazards</b></p> <p>Safe Operating Procedure (SOP) and Code of Practice (COP) for Various Civil Works, Works at Heights and Various Safe Conditions Including Fall Protection and Preventive Measures. Personal Protective Aids for Working at Construction Site. Permit to Work System.</p> <p><b>Mining Hazards</b></p> <p>Mine Rules and Regulations (CMR 2017 and MMR 1961), Specific Statutory Provisions from DGMS Circulars, Mine Act, Bye Laws for Safe Mining. Permit to Work System.</p> <p><b>Hazards in survey works</b></p> <p>Various types of hazards in survey works, Safety precaution in survey works. Precaution adopted in survey related works associated with Transmission towers, railways, power plants, transformer installations. safety requirements while working at height, prevention of falls at floor level. Precautions from falling of materials.</p>		
<b>Unit3</b>	<p><b>Hygiene Concept, definition and importance of hygiene in construction industry:</b> Difference between domestic hygiene and industrial hygiene. Physical hazards – heat stress and its control, ventilation, noise, vibration, illumination, thermal radiation, X rays, ultra violet radiation, ionizing and non-ionizing radiations, sensitization to different air, water and waste water, soil contaminant related to construction industries, permissible exposure limits, effects of exposure, preventive and control measures.</p>	8	10
<b>Unit4</b>	<p><b>Industrial safety legislations</b></p> <p>Legislative Measures in Industrial Safety: Factories Act, 1948, Workmen’s Compensation Act, 1943, Employees State Insurance Act, 1948. Water (Prevention and Control) Pollution Act, 1974,. Child Labour and Women Employee Act.</p> <p>ILO Convention and Recommendations in the Furtherance of Safety, Health and Welfare.</p>	12	15

	Occupational Safety, Health and Environment Management: Bureau of Indian Standards on Safety and Health 14489 - 1998 and 15001 – 2000 OSHA(Occupational Safety and Health Administration).		
<b>Unit5</b>	<p><b>Safety management</b></p> <p>Safety Management- Principles &amp;Practices with Case Studies, Role of Management in Industrial Safety.</p> <p>Safety Organization: Role of Safety Committee and its Formation,</p> <p>Safety Awareness Programme: Motivation, Education and Training, Appraisal of Industrial Safety and Measurement of Safety Performance.</p>	5	10
<b>Total</b>		45	60

**Suggested learning resources:**

- ISO 14001
- ISO 45001:2018/OHSAS 18001
- ILO Legislation
- Jha, N. Kumar, Patel, Dilip A, Singh Amarjit, Cosntruction Safety Management, Pearson India Education Seervices Pvt. Ltd, Noida, UP.
- Haldar, S.K., Occupational Health & Hygiene in Industry, CBS Publishers
- Das, Akhil Kumar, Principles of Industrial Safety Management by, PHI

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

- Understand the basic philosophy of safety engineering
- Interpret the existing safety engineering guidelines and recommendations
- Identify various safety requirements in construction and associated sectors.
- Understand hygiene and safety associated with construction industries
- Analyze the problems related to safety hazard and contaminant discharge from construction industries and to suggest remedial measures.

<b>Name of the Course: Diploma in Survey Engineering</b>	
Course Title: <b>Township Planning</b>	CourseCode:SEPE302/3
Number of Credits:3	Semester: Sixth
<b>Teaching Scheme</b>	<b>Examination/Scheme</b>
Duration:15weeks	MaximumMarks:100
Theory:3hours/ week	Continuous internal Assessment (INT):20Marks
Tutorial:Nil	Assignment/ Presentation/ Quiz (AS/QZ): 10 Marks
Practical:Nil	Attendance (ATD): 10 Marks
Total Contact Hours: 45hrs.	End Semester Examination (ESE):60marks

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

Course Category : PE

Course Objective

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

- Understand the importance and the basic guidelines of town planning.
- Learn the basic concept of zoning and various aspects of town planning.
- Learn the application of Survey Engineering and Building Bye-Laws for preparation of the development plans in Town Planning.
- Understand the requirements of urban roads and traffic management in town planning.

Unit	Course Content	Hour/Unit	Marks
<b>Unit1</b>	<b>1.0 Introduction</b>  1.1 Objects, Principles and Necessity of Town Planning  1.2 Origin and Growth of Towns, Distribution of land uses, Forms of planning, Important features of the site of a town	6	10
<b>Unit2</b>	<b>2.0 Town Planning Surveys</b>  2.1 Necessity and types of Survey in Town Planning  2.2 Collection of Data and Methods of data collection, Drawings and Report of Town planning Surveys	10	15
<b>Unit3</b>	<b>3.0 Zoning</b>  3.1 Objects, Principle, Advantage and Importance of Zoning.	8	10

	3.2 Requirements and classification of: Housing, Public Buildings, Industries, Parks and Playgrounds		
<b>Unit4</b>	<b>4.0 Building Bye-Laws and Development Plan</b> 4.1 Objects and Applicability of Building Bye-Laws 4.2 Principles underlying Building Bye-Laws, Set-Back, Light Plane, Floor Space Index, Minimum Plot Sizes, Margin and Maximum Built-Up Area 4.3 Objects and necessity of Development Plan 4.4 Required data, drawings and report for Development Plan	12	15
<b>Unit5</b>	<b>5.0 Urban Roads and Traffic Management</b> 5.1 Objects, Requirements and Classification of Urban Roads, Types of street systems 5.2 Objects of Traffic Management, Traffic Surveys, Road junctions and intersections, Parking, Traffic Signals, Road Signs, Road Markings, Street lighting in a town.	9	10
<b>Total</b>		45	60

**Suggested learning resources:**

- Town Planning by S C Rangwala, Charotar Publishing House
- Fundamentals of Town Planning by G. K. Hiraskar, Dhanpat Rai Publishing
- Urban Planning in India by Amiya Kumar Das, Rawat Publications
- Urban Planning Theory and Practice by Rao M. P., CBS Publishers
- Introduction to Urban Development and Planning by B. K. Pattanaik, SAGE Publications

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

1. Understand the importance and significance of various features of town planning.
2. Use the basic guidelines of town planning in zoning.
3. Apply the basic knowledge of Surveying in Town Planning.
4. Use the knowledge of Building Bye-Laws for preparation of the development plans in Town Planning.
5. Learn the basic requirements and classification of urban roads and its significance in town planning.
6. Learn the various aspects of traffic management and its application in town planning.

<b>Name of the Course: Diploma in Survey Engineering</b>	
Course Title: <b>Seminar</b>	Course Code: SESE 302
Number of Credits:1	Semester: Sixth
<b>Teaching Scheme</b>	<b>Examination/Scheme</b>
Duration:15 weeks	MaximumMarks:100
Theory:Nil	Practical Internal Assessment (PIA):60Marks
Tutorial:Nil	
Practical:2 hrs per week	
Total Contact Hours: 30	Practical External Assessment (PEA):40marks

Pre-requisites : Students should have good presentation skill.

Course Category : Seminar

#### Course Objectives

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

- Acquire information from different sources.
- Prepare presentation for given topic or project.
- Present seminar using different audio visual method
- Interact with audience to share thoughts.
- Defend their project by answering queries from audience.

<b>Instructions:</b>
Seminar should be presented by group or individual. This will be decided by the respective faculty member.

<b>Content</b>	Seminar is intended to provide opportunity to the student to present a project related work or any subject related topic given by respective faculties in front of a technical gathering with the help of different oral, aural and visual communication aids. In the seminar students are expected to defend the project or topic while answering questions arising out of their presentation.
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<b>Course Outcomes:</b>
Upon completion of this course student should be able to Present given topic in a seminar using different audio visual method.

<b>Name of the Course: Diploma in Survey Engineering</b>	
Course Title: <b>Major Project</b>	CourseCode:PR302
NumberofCredits:3	Semester: Sixth
<b>Teaching Scheme</b>	<b>Examination/Scheme</b>
Duration:15weeks	MaximumMarks:100
Theory:Nil	Practical Internal Assessment (PIA):60Marks
Tutorial:Nil	
Practical:6Classes/week	
Total Contact Hours: 90hrs.	Practical External Assessment (PEA):40marks

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

Course Category : Project

Course Objectives

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

- Read a topographical map and understand its uses in planning of a township.
- Understand the procedures of land development and planning required in a small township.
- Prepare report including drawing using the surveyed data collected in the field.
- Enhance knowledge to represent the surveyed data.

Sl.No.	Assignments/Practical
<b>Land Development &amp; Planning of a Small Township on a topographical map</b>	
1	<u>Field and Laboratory works of the project</u> 1.1 Arrangement of a topographical map of an area not less than 1 sq. km. (preferably prepared by indirect contouring method at Annual Survey Training Camp) 1.2 Collection of Socio-economic, rainfall, High Flood Level data of the area. 1.3 Zoning, Preparation of Master Plan with division of Sectors, Streets on the topographic map for the proposed township. 1.4 Preparation of Street map and any one of the water supply map, surface drains map and power supply map 1.5 Land development work, Quantity and rough cost estimate of earth work required in

	different zones
2	<p><u>Preparation of the Project Report</u></p> <p>The project report should include the following information:</p> <p>2.1 Introduction</p> <p>2.2 Necessity and back ground of the township</p> <p>2.3 Representation of Socio-Economic survey, rainfall, High Flood Level data (Pie Chart and Bar Chart of the data may be prepared by using Ms-Excel)</p> <p>2.4 Land development work along with the following:</p> <p>i) Allocation of land for use of different purpose, ii) Quantity and rough cost Estimate for earth work-cutting, filling, leveling, surface dressing in different zones</p> <p>2.5 Overall benefit of the project</p> <p>2.6 Conclusion and recommendation</p> <p>2.7 The following maps are to be submitted along with the report:</p> <p>i) Topographical map used in the project (Prepared at annual survey training camp),  ii) Master plan of the township (Plan shown only: division of sectors, location of streets),  iii) Proposed Street map and any one of the: water supply map, surface drains map and power supply map.</p>

#### **Suggested learning resources**

- Surveying and Levelling (Vol.1 & 2)by S. K. Duggal,TATAMcGRAW-HILL
- Surveying(Vol.1&,2)by Dr.K.R.Arora, STANDARDBOOK HOUSE
- Surveying and Levelling byN.N. Basak,TATAMcGRAW-HILL
- Surveying and Levelling(Vol. 1 &,2)byDr. B.C. Punmia,Laxmi Publication

#### **Course outcomes:**

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

- Read a topographical map and use it in the planning of a township.
- Learn the procedures of necessary survey work required for the project.
- Compute necessary survey data from map and from field observation.
- Prepare a lay out of a new township on a topographical map.
- Prepare the lay outs of streets and various other required components of a township on a topographical map.
- Grow the knowledge on the preparation and presentation of a project report.



<b>Name of the Course: Diploma in Survey Engineering</b>	
Course Title: <b>Survey Training Camp</b>	Course Code: SEPC 304
NumberofCredits:2	Semester: Sixth
<b>Teaching Scheme</b>	<b>Examination/Scheme</b>
Duration:15 weeks	MaximumMarks:100
Theory:Nil	Practical Internal Assessment (PIA):60Marks
Tutorial:Nil	
Practical:4 hrs per week	
Total Contact Hours: 60 hrs	Practical External Assessment (PEA):40marks

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

Course Category : PC

Course Objectives

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

- Measure necessary observation with the survey instruments
- Compute and record necessary survey data from field observation for drawing.
- Prepare drawing using survey data.

<b>INSTRUCTIONS:</b>	
<b>Sl.No.</b>	
1.	Group size for survey practical work may be formed by subject teacher
2.	Each student from a group should handle the instrument independently to understand the function of different components and use of the instrument.
3.	Drawing and plotting should be considered as part of practical.
4.	Term work shall consist of record of all practical and projects in field book and drawing of Project work on full/half imperial size drawing sheets.

<b>Sl.No.</b>	<b>Assignments/Practical</b>	<b>Remarks</b>
1	Direct Contouring Method using Plane Table ,Auto Level and Theodolite / Total Station	

2	Preparation of Topo-Map (of an area not less than 1 sq. km) applying the concept of Indirect contouring by square method using Auto level, Theodolite or Total Station	Classes may be conducted at the beginning of the semester at any suitable location.
3	Indirect contouring of a hilly area by Total Station /Tacheometer.	
4	Minor triangulation with single chain of triangle	
5	Trilateration with Braced Quadrilaterals.	
6	Road Project Survey (of a distance not less than 1 km) using Total Station or Theodolite.	
7	Map preparation of Institute Premises using GPS/ DGPS.	

**Suggested learning resources:**

- Surveying Vol. I, II and III by Dr. K. R. Arora. Standard Book House, Delhi.

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

- Prepare direct and indirect contour maps.
- Prepare topographical map of an area.
- Establish horizontal control points using triangulation and trilateration.
- Learn the use of Total Station and Theodolite in a road survey.
- Learn the procedure and use of GPS in map preparation.

# **Syllabus of Engineering Economics & Project Management**

Course Code:	OE302
Course Title:	Engineering Economics & Project Management
No. of Credits:	3 (L: 3, T: 0, P: 0)
Prerequisites:	NIL
Course Category:	Open Elective (Compulsory for all branches)

## Course Objectives:

- To acquire knowledge of basic economics to facilitate the process of economic decision making.
- To acquire knowledge on basic financial management aspects.
- To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.
- To develop an understanding of key project management skills and strategies.

## **Group-A**

### **Unit-I (INTRODUCTION, THEORY OF DEMAND & SUPPLY) [9 hours]**

1.1 Introduction to Engineering Economics, the relationship between Engineering and Economics

1.2 Resources, scarcity of resources, and efficient utilization of resources.

1.3 Opportunity cost, Rational Choice Theory

#### **1.4 Theory of Demand:**

- The law of demand
- Different types of demand (Individual demand & Market demand)
- Determinants of demand
- Demand function
- Change in demand (Shift of demand curve) and the change in quantity demanded.
- Definition and types of Elasticity of demand (price, income & cross price elasticity) with mathematical derivation, Concept of elastic and inelastic goods, Measurement of price elasticity of demand (Point elasticity and Arc elasticity), Variation of price elasticity on different points of a linear demand curve, ranging from zero to infinity, Relationship between price, total revenue and price elasticity of demand (mathematical derivation).

### **1.5 Theory of Supply:**

- Definition of supply
- Determinants of supply
- Supply function
- Supply curve and shift of supply curve.

### **1.6 Market mechanism:**

- Definition of Market
- Price mechanism: determination of equilibrium price and quantity demand & supply (Numerical examples with graphical illustration).
- Stability of equilibrium.
- Basic comparative static analysis: Change in equilibrium due shift of demand & supply curve (Numerical problems with graphical illustration).

## **Unit-II (THEORY OF PRODUCTION & COSTS) [10 hours]**

2.1: **Theory of Production:** Concept of production (goods & services), Different factors of production (fixed and variable factors), Short-run Production function (Graphical illustration), law of return (graphical and mathematical derivation), and Long run production function (returns to scale).

2.2: **Theory of Cost:** Short-run and long-run cost curves with graphical illustration, basic concept on total cost, fixed cost, variable cost, marginal cost, average cost etc. with the diagrammatic concept., Relationship between AC AND MC.

2.3: Economic concept of profit, profit maximization (numerical problems)

## **UNIT-III (DIFFERENT TYPES OF MARKET AND ROLE OF GOVERNMENT) [4 hours]**

3.1: Perfect Competition: Features of Perfectly Competitive Market.

3.2: Imperfect Competition: Monopoly, Monopolistic Competition, and Oligopoly.

3.3: Role of government in Socialist, Capitalist and Mixed Economy structure with example.

## **Group-B**

### **Unit-I (CONCEPT OF PROJECT) [4 hours]**

1.1: Definition and classification of projects

1.2: Importance of Project Management.

1.3: Project life Cycle [Conceptualization→Planning→Execution→Termination]

### **Unit-II (FEASIBILITY ANALYSIS OF A PROJECT) [10 hours]**

2.1: Economic and Market analysis.

2.2: Financial analysis: Basic techniques in capital budgeting – Payback period method, Net Present Value method, Internal Rate of Return method.

2.3: Environmental Impact study – adverse impact of the project on the environment.

2.4: Project risk and uncertainty: Technical, economical, socio-political, and environmental risks.

2.5: Evaluation of the financial health of a project – Understanding the basic concept of Fixed & Working Capital, Debt & Equity, Shares, Debentures etc., and different financial ratios like Liquidity Ratios, Activity Ratios, Debt-equity ratio & Profitability Ratio (Basic concept only).

N.B: Knowledge of financial statements is not required; for the estimation of ratios the values of the relevant variables will be provided.

### **Unit-III (PROJECT ADMINISTRATION) [8 hours]**

3.1: **Gantt Chart** – a system of bar charts for scheduling and reporting the progress of a project (basic concept).

3.2: **Concept of Project Evaluation and Review Technique (PERT) and Critical Path method (CPM):** basic concept and application with real-life examples.

### **Examination Scheme:**

A. Semester Examination pattern of 60 marks:

1. Objective type Question (MCQ, Fill in the blanks, and Very Short question-1 mark each): At least five questions from each unit. [Total marks: 20]

2. Subjective questions: Five questions to be answered taking at least two from each group. [Total marks: 5x8=40]

B. Assignment (10 Marks)

#### Guideline for Assignment (10 Marks)

Students may be instructed to prepare a report on a project (preferably the based on the Major Project in 6th Semester), using a popular project management software in IT/Computer Laboratory, under the guidance of the Lecturer in Computer Science & Technology and Lecturer in Humanities.

C. Class Test: Two examinations 20 marks each. Take best of two.

D. Attendance: 10 Marks

*Suggested reference books:*

- 1. Principles of Economics – Case and Fair, Pearson Education Publication*
- 2. Principles of Economics – Mankiw, Cengage Learning*
- 3. Project planning, analysis, selection, implementation and review – Prasannachandra – Tata McGraw Hill.*
- 4. Project Management – Gopala krishnan – Mcmillan India Ltd*

<b>Course Title</b>	<b>Entrepreneurship and Start-ups</b>
Course Code	HS 302
Number of Credits	3
Pre Requisites	None
Total Contact Hours	3(L: 2; T: 1)/week = 45 hrs
Course Category	HS

### Course Learning Objectives

1. To raise awareness, knowledge and understanding of enterprise/ entrepreneurship.
2. To motivate and inspire students toward an entrepreneurial career.
3. To understand venture creation process and to develop generic entrepreneurial competences.
4. To introduce students to the basic steps required for planning, starting and running a business.
5. To familiarise students with the different exit strategies available to entrepreneurs.

### Course Outcomes:

After completing the course students will able to:

CO 1	Identify qualities of entrepreneurs, develop awareness about entrepreneurial skill and mindset and express knowledge about the suitable forms of ownership for small business
CO 2	Comprehend the basics of Business idea, Business plan, Feasibility Study report, Project Report and Project Proposal
CO 3	Understand the concept of start-up business and recognise its challenges within legal framework and compliance issues related to business.
CO 4	Make a Growth Plan and pitch it to all stakeholders and compare the various sources of funds available for start-up businesses

### Detailed Course Content

Unit	Name of the Topic	Hours
	<b>ENTREPRENEURSHIP – INTRODUCTION AND PROCESS</b>	
1.	<ul style="list-style-type: none"> <li>• Concept, Competencies, Functions and Risks of entrepreneurship</li> <li>• Entrepreneurial Values&amp; Attitudes and Skills</li> <li>• Mindset of an employee/manager and an entrepreneur</li> <li>• Types of Ownership for Small Businesses               <ul style="list-style-type: none"> <li>○ Sole proprietorship</li> <li>○ Partnerships</li> <li>○ Joint Stock company- public limited and private limited</li> </ul> </li> </ul>	10

	<p>companies</p> <ul style="list-style-type: none"> <li>• Difference between entrepreneur and Intrapreneur</li> </ul>	
2.	<p><b>PREPARATION FOR ENTREPRENEURIAL VENTURES</b></p> <ul style="list-style-type: none"> <li>• Business Idea- Concept, Characteristics of a Promising Business Idea, Uniqueness of the product or service and its competitive advantage over peers.</li> <li>• Feasibility Study – Concept – Locational, Economic, Technical and Environmental Feasibility. Structure and Contents of a standard Feasibility Study Report</li> <li>• Business Plan – Concept, rationale for developing a Business Plan, Structure and Contents of a typical Business Plan</li> <li>• Project Report- Concept, its features and components</li> <li>• Basic components of Financial Statements- Revenue, Expenses (Revenue &amp; capital exp), Gross Profit, Net Profit, Asset, Liability, Cash Flow, working capital, Inventory. Funding Methods-Equity or Debt.</li> </ul> <p>Students are just expected to know about the features and key inclusions under, Business Plan and Project Report. <u>They may not be asked to prepare a Business Plan/ Project Report/ Project Feasibility Report in the End of Semester Examination.</u></p>	20
3.	<p><b>ESTABLISHING SMALL ENTERPRISES</b></p> <ul style="list-style-type: none"> <li>• Legal Requirements and Compliances needed for establishing a New Unit- <ul style="list-style-type: none"> <li>○ NOC from Local body</li> <li>○ Registration of business in DIC</li> <li>○ Statutory license or clearance</li> <li>○ Tax compliances</li> </ul> </li> </ul>	03
4.	<p><b>START-UP VENTURES</b></p> <ul style="list-style-type: none"> <li>• Concept &amp; Features</li> <li>• Mobilisation of resources by start-ups: Financial, Human, Intellectual and Physical</li> <li>• Problems and challenges faced by start-ups.</li> <li>• Start-up Ventures in India – Contemporary Success Stories and Case Studies to be discussed in the class.</li> </ul> <p>Case studies have been included in the syllabus to motivate and inspire students toward an entrepreneurial career from the success stories. <u>No questions are to be set from the case studies.</u></p>	04



5.	<b>FINANCING START-UP VENTURES IN INDIA</b> <ul style="list-style-type: none"> <li>• Communication of Ideas to potential investors – Investor Pitch</li> <li>• Equity Funding, Debt funding – by Angel Investors, Venture Capital Funds, Bank loans to start-ups</li> <li>• Govt Initiatives including incubation centre to boost start-up ventures</li> <li>• MSME Registration for Start-ups –its benefits</li> </ul>	06
6.	<b>EXIT STRATEGIES FOR ENTREPRENEURS</b> <ul style="list-style-type: none"> <li>• Merger and acquisition exit, Initial Public Offering (IPO), Liquidation, Bankruptcy – <b><u>Basic Concept only</u></b></li> </ul>	02

### Examination Scheme

#### ❖ End Semester Examination: 60 marks

Suggested Question Paper Scheme for End Semester Examination

#### Group A: 20marks

Question Type	Number of questions to be set	Number of questions to be answered
MCQ, Fill in the blanks, True or False ( Carrying 1 mark each)	25	20

#### Group B: 40marks

Question Type	Number of questions to be set	Number of questions to be answered
Subjective Type questions (Carrying 8 marks each)	10	5

#### ❖ Internal Assessment: 40 marks

- Class test : 20 marks
- Assignment: 10 marks
- Class attendance: 10 marks

### Suggested Learning Resources

<b>Sl. No.</b>	<b>Title of Book</b>	<b>Author</b>	<b>Publication</b>
1.	Entrepreneurship Development	Sangeeta Sharma	Prentice Hall of India Learning Private Ltd
2.	Entrepreneurship Development	S. Anil Kumar	New Age International
3.	Fundamentals of Entrepreneurship	Sangram Keshari Mohanty	Prentice Hall of India Learning Private Ltd
4.	Fundamentals of Entrepreneurship	Dr. G.K. Varshney	Sahitya Bhawan Publication
5.	Managing New Ventures: Concepts and Cases on Entrepreneurship	Anjan Raichaudhuri	Prentice Hall of India Learning Private Ltd
6.	How to Start a Business in India	Simon Daniel	Buuks, Chennai
7.	Entrepreneurship and Small Business Management	S.S. Khanka	S. Chand & Sons, New Delhi
8.	Entrepreneurship Development and Business Ethics	Abhik Kumar Mukherjee & Shaunak Roy	Oxford University Press
9.	Entrepreneurship Development and Business Ethics	Dr B Chandra & Dr B Biswas	Tee Dee Publications
10.	Entrepreneurship Development Small Business Entrepreneurship	Poornima Charantimath	Pearson Education India

PROPOSED SYLLABUS FOR ENVIRONMENTAL SCIENCE &  
ENGINEERING

<b>Course Code</b>	OE
<b>Course Name</b>	ENVIRONMENTAL SCIENCE & ENGINEERING
<b>Number of Credits and L-T-P</b>	3 [L - 3, T - 0, P - 0]
<b>Course Category</b>	OE
<b>Prerequisites</b>	NA

**Course Objectives:**

After completing this course, the students will be able

1. To increase the awareness towards Environmental Science and Engineering.
2. To recognize and apply the role of technology towards Environmental Science and Engineering.
3. To know the method and tools used for Environmental Science and Engineering.
4. To know about the environmental pollution management act.

**Course Contents:**

<b>Unit No.</b>	<b>Description of Topic</b>	<b>Contact Hrs.</b>
01	<p><b>Environment and Ecology</b></p> <p>1.1 Classification of Environment            1.2 Environmental descriptors            1.3 Environmental quality and descriptive parameters            1.4 Ecology: Definition and classification            1.5 Environmental impact on ecology</p>	08
02	<p><b>Water pollution and pollutants (Natural and Anthropogenic)</b></p> <p>2.1 Ground water: Sources and quality analysis            2.2 Surface water: Sources and quality analysis            2.3 Quality parameters in water treatment along with flow-sheets            2.4 Basic processes for potable water supply (Detailed technology not necessary)            2.5 Water pollution: Surface and ground water pollution, types of pollutants            2.6 Mode of water pollution            2.7 Parameters to be assessed for water pollution (Turbidity, pH, total suspended solids, total solids, BOD and COD:</p>	10

	Definition, calculation) 2.8 Chemistry aspect for water pollution 2.9 Control of water pollution (Description only) 2.10 Fundamental of water treatment techniques.	
03	<b>Air quality, Air Pollution and Control, Noise Pollution</b>  3.1 Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler) 3.2 Air Pollutants: Types, Units of air pollutants 3.3 Atmospheric physics for air pollution 3.4 Particulate Pollutants: Effects and control strategies (Bag filter, Cyclone separator, Electrostatic Precipitator) 3.5 Advanced air pollution control methods 3.6 Noise pollution: sources of pollution, measurement of noise pollution 3.7 Noise measuring devices and their demonstration	10
04	<b>Solid waste and Soil pollution</b>  4.1 Definition of solid waste 4.2 Classification of solid waste 4.3 Overview on municipal, industrial, hazardous, hospital, plastic, E-waste.etc. 4.4 Solid waste management and disposal process. 4.5 Soil pollution ,Poor Fertility, Septicity, Concentration of Infecting Agents in Soil 4.6 Leaching and its impact on soil pollution.	06
05	<b>Renewable sources of Energy</b>  5.1 Energy Resources: Energy scenario, national and international status. 5.2 Solar Photovoltaics: Solar radiation and types, basic working principle of solar PV, solar cells and types, water pumping and applications of solar PV. 5.3 Solar Thermal system: basic working principle and applications of solar thermal energy, solar water	06

	heater and types, solar cooking, solar pond, Solar still etc. 5.4 Wind energy systems: basic principle, types of wind turbines, application of wind energy, 5.5 Bio-energy systems: bio thermal and chemical basic principle, gasifier and digesters. 5.6 Hydro energy systems: small and micro hydro systems and its basic working. 5.7 Geothermal energy: Basic working principle, types and application of geothermal energy. 5.8 Ocean & Tidal Energy: Basic working principle, applications and types of different types of energy generation through ocean and tidal systems	
<b>06</b>	<b>Environment Legislation system and Rules</b> 6.1 Environmental protection rules 6.2 Sustainable environmental management	02
<b>Total Hours</b>		<b>42</b>

**Weightage distribution in both objective, short and broad answer type questions:**

Group	Unit Number	Weightage (%)
A	1 & 2	50
B	3 & 4	30
C	5 & 6	20

**Course Outcomes:**

At the end of the course, the student will be able to:

<b>C01</b>	Recognize the relevance and the concept of Environmental Science and Engineering and different world-wide activities on this area.
<b>C02</b>	Illuminate the different types of environmental pollutant, their effects and their sustainable solutions.
<b>C03</b>	Discuss the environmental regulations act. and standards
<b>C04</b>	Gather basic idea about conventional and non-conventional energy resources
<b>C05</b>	Demonstrate the broad perspective of Environmental Science practices by utilizing engineering knowledge and principles

**Text Books:**

1. Environmental Studies- By N.N.Basak
2. Environmental Studies-By D .Srivastava
3. Introduction to Environmental Engineering— By Dr.Manindra Nath Patra.
4. Environmental Engineering- By A.K.Jain

**Reference Books:**

1. Environmental Engineering---By G.Killy
2. Environmental Engineering--- By Peavy, Rowe
3. Water and Waste Water Engineering— By S.Garg
4. Waste Water Engineering--By -Panmia
5. Non-conventional Energy Sources-4<sup>th</sup> Edition, By Prasad Rajesh K and Ojha
6. Non-conventional Energy Resources—By Chauhan and Srevastava
7. Non-conventional Energy Sources---By G.D.Rai (Khanna Publisher)
8. Ecology --By -Odum
9. Ecology---By -Das & Das
10. Environmental Law ---By -Gurdip Sing
11. Environmental Law----By Jaiswal Jaiswal Jaiswal
12. Environmental Law in India ---By -P.Leela Krishnan
13. Environment Impact Assessment Guidelines, Notification of Government of India, 2006
14. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998
15. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA Rating System