Sanjay Ghodawat University

Kolhapur

School of Engineering & Technology

Department of Civil Engineering

B. Tech. Civil Engineering
(Second Year)

Curriculum Book

(Programme Structure and Course Contents)

Academic Year 2024 -25

Programme structure for B. Tech. Civil Engineering

Second Year Civil Engineering Programs Semester III: Teaching Scheme

Course code	Course name	Teaching scheme (Hrs/week)			Credits assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total credits
U13PC301	Structural Mechanics	3	-	-	3	-	-	3
U13PC302	Building Design and Drawing	3	-	-	3	-	-	3
U13PC303	Engineering Surveying	3	-	-	3	-	-	3
UXXMM0XX	Multidisciplinary Minor I	2	-	-	2	-	-	2
UXXOE01X	Open Elective I	2	-	-	2	-	-	2
U01EM001	Engineering Economics	2	-	-	2	-	-	2
U13PC304	Structural Mechanics Lab	-	2	-	-	1	-	1
U13PC305	Building Design and Drawing Lab	-	4	-	-	2	-	2
U01VE003	Environmental Sciences	2	-	-	2	-	-	2
U13FP001	Field Project		4	-	-	2	-	2
	Total	17	10		17	5		22

Second Year Civil Engineering Programs Semester III: Evaluation Scheme

Course code	Course name	*Theory Marks*					*Practical Marks*		Total
		Internal Assessment				ESE	Term work	Practical/ Oral POE	
		T1	T2	FET	Total				
U13PC301	Structural Mechanics	10	10	5	25	50	-	-	75
U13PC302	Building Design and Drawing	10	10	5	25	50	-	-	75
U13PC303	Engineering Surveying	10	10	5	25	50	-	-	75
UXXMM0XX	Multidisciplinary Minor I	10	-	5	15	35	-	-	50
UXXOE01X	Open Elective I	10	-	5	15	35	-	-	50
U01EM001	Engineering Economics	10	-	5	15	35	-	-	50
U13PC304	Structural Mechanics Lab	-	-	-	-	-	25	-	25
U13PC305	Building Design and Drawing Lab	-	-	-	-	-	25	25	50
U01VE003	Environmental Sciences	10	-	5	15	35	-	-	50
U13FP001	Field Project	-	-	-	-	-	25	25	50

* Minimum passing is 40% for all courses and evaluation head mentioned above. FET – Faculty evaluation for Theory , T1, T2, Continuous Assessment Test, Term Work , ESE - End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course

Programme structure for B. Tech. Civil Engineering

Second Year Civil Engineering Programs Semester IV: Teaching Scheme

Course code	Course name	Teaching scheme (Hrs/week)			Credits assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total credits
U13PC401	Fluid Mechanics	3	-	-	3	-	-	3
U13PC402	Geotechnical Engineering	3	-	-	3	-	-	3
U13PC403	Theory of Structure	2	-	-	2	-	-	2
UXXMM0XX	Multidisciplinary Minor II	2	-	-	2	-	-	2
UXXOE02XX	Open Elective II	2	-	-	2	-	-	2
U01EM002	Engineering Management	2	-	-	2	-	-	2
U13VS401	Software Proficiency I	- -	4	-	-	2	-	2
U13PC404	Fluid Mechanics Lab	-	2	-	-	1	-	1
U13PC405	Geotechnical Engineering Lab	-	2	-	-	1	-	1
U13AE401 U13AE402	Modern Indian Language – Hindi OR Modern Indian Language – Sanskrit	2	-	-	2	-	-	2
U03VE404	Universal Human Values II	2	-	-	2	-	-	2
	Total	18	8		18	4		22

Second Year Civil Engineering Programs Semester IV: Evaluation Scheme

Course code	Course name	*Theory Marks*					*Practical Marks*		Total
		Internal Assessment				ESE	Term work	Practical / Oral POE	
		T1	T2	FET	Total				
U13PC401	Fluid Mechanics	10	10	5	25	50	-	-	75
U13PC402	Geotechnical Engineering	10	10	5	25	50	-	-	75
U13PC403	Theory of Structure	10	-	5	15	35	-	-	50
UXXMM0XX	Multidisciplinary Minor II	10	-	5	15	35	-	-	50
UXXOE02XX	Open Elective II	10	-	5	15	35	-	-	50
U01EM002	Engineering Management	10	-	5	15	35	-	-	50
U13VS401	Software Proficiency I	-	-	-	-	-	25	25	50
U13PC404	Fluid Mechanics Lab	-	-	-	-	-	25	-	25
U13PC405	Geotechnical Engineering Lab	-	-	-	-	-	25	-	25
U13AE401 U13AE402	Modern Indian Language – Hindi OR Modern Indian Language – Sanskrit	10	-	5	15	35	-	-	50
U03VE404	Universal Human Values II	10	-	5	15	35	-	-	50

* Minimum passing is 40% for all courses and evaluation head mentioned above. FET – Faculty evaluation for Theory , T1, T2, Continuous Assessment Test, Term Work , ESE - End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course

Exit Option:

- Students will have the flexibility to enter a programme in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs.
- Students exiting the Second Year Programme after securing minimum 80 credits will be awarded UG Diploma in the relevant Discipline /Subject provided they secure additional 8 credits in skill-based vocational courses (skill-based courses, internship, mini projects etc) offered during summer vacation after the second year.

Contents

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC301	Structural Mechanics	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U13PC301	**Structural Mechanics**	10	10	5	25	40%	50	40%	75

Course Description

The focus will be very much on basic mechanical properties of various materials like mild steel, copper, aluminium, tor steel etc. Fundamental laws of elasticity, elastic constants, concept of stress and strain, stress concentration will be taught. The Behaviour of beams, shaft and cylinders under different kind of loadings will be also focused.

Pre-requisites: Engineering Mechanics, Engineering Mathematics I, II.

Course Objectives

- Understand concept of basic properties of steel and concrete material
- Discuss various principles like St. Venant principle, Principle of superposition, Work-energy principle, Virtual work principle, Equilibrium conditions

Course Learning Outcome(s) *At the end of this course students will able to:*

CLO1 Able to apply the linear laws of elasticity as related to stress and strain.

CLO2 Illustrate the concepts of solid mechanics

CLO3 Analyze structural members subjected to tension, compression, torsion, bending and combined stresses

CLO4 Analyze structural members subjected to strain energy

Course Contents

Module	Unit	Description	Hours
1.0		**Simple stress and strain**	**9**
1	1.1	Concept of simple stress and strain, Hooke's law, elastic behavior of the body under external actions, composite sections under axial loading.	
	1.2	Elastic constants, normal stresses and strains in three dimensions.	
2.0		**Shear force and bending moment diagrams:**	**9**
2	2.1	Shear force and bending moment diagrams for statically determinant beams for point loads, moments, uniformly distributed and uniformly varying loads, concept of point of contra flexure.	
	2.2		
3.0		**Bending and Shear stress distribution in Beams:**	**9**
3	3.1	Bending stresses in beams Assumptions in pure bending, bending formula, and moment of resistance, Stress distribution diagrams for rectangular, round, L and T shape beams etc.	
	3.2	Shear stress equation, Stress distribution diagrams for rectangular, round, L, T and triangular shape beams etc.	
4.0		**Strain Energy in beams and Analysis of Column**	**9**
4	4.1	Strain energy due to different types of actions, impact loading. Strain energy method for deflection of determinate beams.	
	4.2	Analysis of long columns, Euler's theory and Rankine's theory	
5.0		**Combined direct and bending stresses**	**9**
5	5.1	Kernel of the section, middle third rule, Direct and bending stresses in column	
	5.2	Stability analysis of gravity dams, retaining walls and chimneys.	

Text Books

1. "Mechanics of Structure" (Vol. I and II) - Junnarkar S.B. and Advi, Charotar Publication.
2. "Mechanics of Materials" - R.C. Hibbler, Pearson Education.

References

1. "Mechanics of Materials" - Gere and Timoshenko, CBS publishers.
2. "Mechanics of Materials" Vol I and II - Punmia, Jain, Laxmi Publications.
3. "Strength of Materials" - S Ramamrutham, Dhanapat Rai Publications.
4. "Strength of Materials" - Bhavikatti S.S., New Age Publications.
5. "Strength of Materials" - R.K.Bansal, Laxmi Publications.
6. "Structural Analysis" - Bhavikatti S.S, Vikas Publications house New Dehli

Internal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC302	Building Design and Drawing	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U13PC302	Building Design and Drawing	10	10	5	25	40%	50	40%	50

Course Description

The main objective of the course is to understand building drawings. Other objectives are; to introduce about the basic terminology, components, and elements of building; to familiarize the students with the standard drawings used by architect/engineers. Emphasis is placed to understand the detail drawings and be able to produce/reproduce the detail drawings of a residential building includes; architect's, structural, service, municipality drawings etc

Pre-requisites: - Basic Civil and Mechanical Engineering

Course Objectives

- Understand the elemental properties of construction materials
- Interpret civil engineering drawings
- Understand the principles of planning, building bye-laws.
- Explain various civil engineering drawings

- **Course Outcomes:** After the successful completion of the course students will able to:

CO1 Know and differentiate elemental properties of construction materials.
CO2 Interpret civil engineering drawings
CO3 Discuss principles of planning, building bye-laws, town planning
CO4 Produce various civil engineering drawings

Course Contents

Module	Unit	Description	Hours
1.0		**Site Selection criteria.**	**9**
1	1.1	Principles of Building planning. Significance Sun diagram. Wind Diagram. Orientation, Factors affecting, criteria under Indian condition.	
2.0		**Building Planning Byelaws & regulations**	**9**
2	2.1	Building Planning Byelaws & regulations as per SP-7, 1983 National Building code of India group 1 to 5.	
	2.2	Planning of Residential Building (Bungalows, Row Bungalows, Apartments and Twin Bungalows) Procedure of Building Permission, significance of commencement, plinth completion or occupancy certificate	
3.0		**Plumbing system, Electrification and Fire resistance in building**	**9**
3	3.1	Plumbing system, Various Materials for system like PVC, GI, AC, CI, HDPE, and Stoneware. Various types of traps, Fittings, Chambers, Need of Septic Tank, Concept of Plumbing & Drainage plan, introduction to rainwater harvesting. Concept of rain water Gutters. Rainwater outlet & Down Tank Systems.	
	3.2	Electrification: - Concealed & Open Wiring, Requirements & Location of various points, Concept of Earthing.	
	3.3	Fire resistance in building: Fire protection precautions, confining of fire, fire hazards, Characteristics of fire resisting materials, building materials and their resistance to fire	
4.0		**Ventilation, Thermal Insulation and Sound Insulation**	**9**
4	4.1	Ventilation: - Definition and necessity of Ventilation, functional requirement, various system & section criteria. Air conditioning: - Purpose, Classification, Principles, Systems & Various Components of the same.	

	4.2	Thermal Insulation: - General concept, Principles, Materials, Methods, Computation of Heat loss & heat gain in Buildings. Introduction to Acoustics: Absorption of sound, various materials, Sabine's formula, optimum reverabaration time, conditions for good acoustics.	
	4.3	Sound Insulation: Acceptable noise levels, Noise prevention at its source, Transmission of noise. Noise control-general considerations.	
5.0		**Introduction to Planning of Public Buildings**	**9**
5	5.1	Introduction to Planning of Public Buildings: Buildings for different purposes like Education, Health, Recreation, Industry and Transportation, Spatial and land use planning,	

References

1. Building Drawing – Shah, Kale, Patki (Tata McGraw- Hill)
2. Building Design and Drawing – Y. S. Sane (Allied Book Stall, Pune)
3. SP 7- National Building Code Group 1 to 5- B.I.S. New Delhi

Internal Assessment (T1, T2 and FET)

1. T2 should be based on First to Fourth modules, for 10 marks.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC303	Engineering Surveying	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U13PC303	Engineering Surveying	10	10	5	25	40%	50	40%	75

Course Description

This course will introduced the fundamentals of surveying measurements to provide a broad overview of the surveying instrumentation, procedures, measurement corrections and reductions, survey datum's, and computations that are required to produce a topographical map or a site plan for engineering and design projects.

Pre-requisites: -

Course Objectives

- Calculate elevation of points.
- Apply knowledge of theodolite in civil engineering field
- Correlate knowledge of curve setting in in field
- Application of modern surveying instruments in field

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** Apply knowledge of levelling to calculate elevation of points.
- **CO2** Correlate the knowledge of theodolite in surveying
- **CO3** Apply knowledge for setting out different types of curves
- **CO4** Apply knowledge of advance surveying.

Course Contents

Module	Unit	Description	Hours
1.0		**Levelling**	**09**
1	1.1	Introduction, Basic definitions, Detail of dumpy Level, Temporary and permanent adjustment of Levels, Sensitiveness of bubble tube; Methods of levelling, reciprocal levelling Effect of curvature and refraction, Auto level , Tilting Level	
	1.2	**Contouring** – Contour interval – Methods of contouring – uses- direct and indirect methods of contouring, Computation of Areas and Volumes.	
2.0		**Theodolite Surveying**	**09**
2	2.1	**Theodolite** – Vernier theodolite – Component, Temporary and permanent adjustments – Measurement of horizontal and vertical angles – Methods of repetition and reiteration –Application of theodolite	
	2.2	**Theodolite traversing** – Objectives – traversing – methods – traverse computations – traverse table – plotting Omitted measurements	
3.0		**Tachometric surveying**	**09**
3	3.1	Tachometric surveying – Principles – Methods – Stadia system –Fixed and Movable hair methods – Methods with staff held vertical and norm– Analytic lens – Sub tense bar – Tangential method.	
	3.2	Trigonometrically surveying: Base of the object accessible – base of an inclined – object accessible – reduced level of the elevated points within accessible bases – instrument axes at different levels	
4.0		**Curve setting**	**09**
4	4.1	Definition, Degree of Curve, types of horizontal curve Elements of Simple Curve, Setting out by simple curve by linear and angular methods	

	4.2	Compound curve, reverse curve, transition combined curve Vertical curves – types, lengths of vertical curves setting out	
5.0		**Advance Surveying**	**09**
5	5.1	EDM principle , Introduction to Total station with field application, Total station, remote sensing GIS, GPS	
	5.2	Photogrammetry- Types of photogrammetry and photographs. Aerial photogrammetry – scale of vertical photographs, flight planning	

References	
1	Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill, 2004..
2	Kanetkar .T.P,"Surveying and Levelling," Vols. I and II, United Book Corporation, Pune, 2007.
3	Punmia .B.C,"Surveying," Vols. I and II, Laxmi Publications,2006
4	Surveying and Levelling - N.N. Basak, Tata Mcgraw Hill, New Delhi
5	Arora K.R., Surveying Vol I & II, Standard Book house , 10th Edition 2008.

Internal Assessment (T1, T2 and FET)

3. T1 (Test 1) should be based on first two modules and T2 (Test 2) should be based on next two modules, for 10 marks each..
4. FET shall be assessed for 5 marks separately.

End Semester Examination

6. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
7. The duration of end semester examination shall be Two hours.
8. The students need to solve all questions.
9. Question No.1 will be compulsory and based on entire syllabus.
10. Remaining question (Q.2 to Q.5) will be selected from all the modules

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC304	Structural Mechanics Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		
		Term Work	Min pass	Marks	Min pass	Total (Marks)
U13PC304	Structural Mechanics Lab	25	40%	-	-	25

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** know and differentiate elemental properties of construction materials
- **CO2** Conduct tension and compression test on different structural material
- **CO3** Conduct and determine flexural strength of beam element
- **CO4** Determine hardness of metals

List of Experiments

1 To study the stress -strain characteristics of Tor steel by conducting tension test on U.T.M.
2 To study the stress - strain characteristics of Aluminum by conducting tension test.
3 To find the Brinnell's hardness numbers of (a) Steel (b) Brass (c) Aluminum.
4 To find the Rockwell hardness numbers of (a) Steel (b) Brass (c) Aluminum.
5 To find the Vicker's hardness numbers of (a) Steel (b) Brass (c) Aluminum.
6 To find the energy absorption of (a) Steel (b) Brass (c) Aluminum by Charpy impact test.
7 To find the energy absorption of (a) Steel (b) Brass (c) Aluminum by IZOD impact test.
8 To determine Compressive Strength of Timber
9 To determine bending Strength of Timber
10 To find the Compressive strength of brick
11 To study water absorption test on brick
12 To study effloresces test on brick
13 To conduct Compression test on Mild Steel rods
14 To determine Shear strength of mild and TMT steel.

References

1. "Mechanics of Materials" - R.C. Hibbler, Pearson Education.
2. "Mechanics of Materials" - Gere and Timoshenko, CBS publishers.
3. "Strength of Materials" - S Ramamrutham, Dhanapat Rai Publications.
4. "Strength of Materials" - Bhavikatti S.S., New Age Publications

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per 'credit and grading system' manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U01EM001	Engineering Economics	02	-	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U01EM001	Engineering Economics	-	10	5	15	40%	35	40%	50

Course Description

The course focuses on economic of engineering projects, giving insights on different techniques and methods used on economic feasibility studies relating to design and implementation of engineering projects. The basic purpose of this course is to provide a sound understanding of concepts and principles of engineering economy and to develop proficiency with methods for making rational decisions regarding problems likely to be encountered in professional practice.

Pre-requisites: - mathematics

Course Objectives

- Understand the importance of economy in engineering field.
- Apply knowledge of economic comparisons for selecting best alternative
- Understand the concept of depreciation
- Explain importance of working capital management
- **Course Outcomes:** After the successful completion of the course students will able to:

- **CO1** Explain importance of economy in engineering field..
- **CO2** Correlate knowledge of economy in decision making
- **CO3** Correlate knowledge of deprecation for engineering field
- **CO4** Explain importance of working capital management in business.

Course Contents

Module	Unit	Description	Hours
1.0		**Fundamentals Economy**	**06**
1	1.1	Introduction to Engineering Economy, Time value of money, Cash flow, cash flow diagrams, simple Interest and compound Interest, inflation, economic factors.	
2.0		**Comparisons of Alternatives**	**06**
2	2.1	Present worth comparisons, Comparisons of assets with equal, unequal lives, comparison of deferred investments , Equivalent uniform annual cost (EUAC) method , Rate of return method , Future worth method, NPV method	
3.0		**Comparisons of Alternatives**	**06**
3	3.1	Payback period method- conventional and discounted payback period method, Benefit cost ration methods , break even analysis method	
4.0		**Depreciation and Inflation**	**06**
4	4.1	Definition method for calculating depreciation straight line method., constant percentage method, sinking fund method, Switching between different depreciation methods, inflation effect of inflation	
5.0		**working capital management**	**06**
5	5.1	Introduction, need of working capital management, financial ratio, Income statement, Financial statements	

References	
1	Leland Blnak, Anthony Tarquin, Engineering Economy , Tata McGraw Hill Publishing Company, New Delhi,
2	Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson

	Education India, 2015.
3	Panneer Selvam, R, "Engineering Economics", Prentice Hall of India Ltd, New Delhi, 2001
4	Degarmo, E.P., Sullivan, W.G and Canada, J.R, "Engineering Economy", Macmillan, New York, 2011

Internal Assessment (T1, T2 and FET)

5. T2 should be based on First to Fourth modules, for 10 marks.
6. FET shall be assessed for 5 marks separately.

End Semester Examination

11. Question paper will be of 35 marks comprise of 5 questions, each carrying 07 marks
12. The duration of end semester examination shall be Two hours.
13. The students need to solve all questions.
14. Question No.1 will be compulsory and based on entire syllabus.
15. Remaining question (Q.2 to Q.5) will be selected from all the modules

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC305	Building Design and Drawing Lab	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		
		Term Work	Min pass	Marks	Min pass	Total (Marks)
U13PC305	Building Design and Drawing Lab	50	40%	-	-	50

Course Description

The main objective of the course is to understand building drawings. Other objectives are; to introduce about the basic terminology, components, and elements of building; to familiarize the students with the standard drawings used by architect/engineers. Emphasis is placed to understand the detail drawings and be able to produce/reproduce the detail drawings of a residential building includes; architect's, structural, service, municipality drawings etc

Course objectives

- understand building drawings. Other objectives are; to introduce about the basic terminology, components, and elements of building
- Emphasis is placed to understand the detail drawings and be able to produce/reproduce the detail drawings of a residential building

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Understand**[2] basic of building drawings
- **CO2** **Demonstrate**[3] components, and elements of building; to familiarize the students with the standard drawings used by architect/engineers

List of Experiments

Lettering, Symbols, Types of lines and dimensioning as per IS 962

1 Drawing to a scale, draw on half imperial drawing sheet.

A) Brick masonry: English bond, Flemish bond, rat trap bond.

B) Stone Masonry: UCR, Course Rubble

C) Doors: T.W. Paneled Door.

D) Windows: T.W., Glazed and aluminum Window.

2 Measurement drawing

a) Imperial size sheet based on actual measurement of existing residential building consisting of plan, elevation, section passing through staircase. Site plan. Area statement and brief specifications (G+1 building and minimum 5 rooms, Measurement drawing should be done in group of maximum 5 students).

b) Site visit along with report.

3 Planning and design of residential building /commercial building (G+1). (Using Auto Cad)

a) Municipal Submission drawing.

b) Working Drawings- Foundation / Center Line Drawing., Furniture layout plan, Electrification plan, Water supply and drainage plan.

References

1. Building Drawing – Shah, Kale, Patki (Tata McGraw- Hill)
2. Building Design and Drawing – Y. S. Sane (Allied Book Stall, Pune)
3. SP 7- National Building Code Group 1 to 5- B.I.S. New Delhi

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per ‘credit and grading system’ manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

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Theory Course

Course code	Course name	Teaching Scheme (Hr/week)			Credits Assigned		
U03VE101	Environmental Science	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		02	-	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
U03VE101	Environmental Science	T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
		10	--	5	15	40%	35	40%	50

Course Description: This course will focus on basic concepts of Environmental components and basic concepts in the field. There will be a discussion about all the environmental conditions, problems, their Solutions, and policies regarding public awareness.

Course objectives

1. To Study of factors affecting the availability of natural resources, their conservation and management.
2. Develop a critical understanding of the environmental issues of concern
3. Study of the sectoral effects on the local, regional, and global environmental issues
4. Study of the concepts of ecosystems, biodiversity and conservation.
5. Study of factors impacting biodiversity loss and ecosystem degradation in India and the world.
6. Study of sources of different kinds of pollution and their adverse health impacts
7. study of the complexity of environmental management
8. study of major international institutions and programmes and their role played

Course Outcomes: after the end of this course students will able to

CO1 **Classify** natural resources and their conditions in local area

CO2 **Interpret** local environmental issues

CO3 **Describe and modify** solution on local environmental issues

CO4 **Develop** a critical understanding of the complexity of environmental management.

CO5 **Understanding** local common biodiversity

Course Contents

Module	Unit	Description	Hours
1.0		**Humans and the Environment**	
1	1.1	• Multidisciplinary nature of environmental studies; Scope and importance • UN Conference on Human Environment 1972; World Commission on Environment and Development, the concept of sustainable development	6
	1.2	**Natural Resources and Sustainable Development** • Land resources and land use change; Land degradation, soil erosion and desertification. • Deforestation: Causes and impacts due to mining, dam building on environment and forests • Water: Use and over-exploitation of surface and ground water, floods, droughts • Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies	
2.0		**Environmental Issues: Local, Regional and Global**	
2	2.1	Global issues: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.	6

	2.2	**Conservation of Biodiversity and Ecosystems:** • Levels of biological diversity: genetic, species and ecosystem diversity; • Global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India • Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions • Conservation of biodiversity In-situ and Ex-situ conservation of biodiversity. • Ecosystem and biodiversity services: Ecological, economic, social, ethical, Aesthetic, and Informational value	
3.0		**Climate Change: Impacts, Adaptation and Mitigation**	
3	3.1	• Environmental pollution: types, causes, effects and controls; Air, water, Noise pollution • Nuclear hazards and human health risks • Solid waste management: Control measures of urban and industrial waste	6
	3.2	Structure of atmosphere; Anthropogenic climate change from greenhouse gas emissions– past, present and future; Mitigation of climate change	
4.0		**Environmental Management**	
4	4.1	• **Environment Laws:** Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act • Environmental management system: ISO 14001, Environmental audit and impact assessment; Ecolabeling /Ecomark scheme.	6
	4.2	**Environmental Treaties and Legislation**: Major International organizations and initiatives: United Nations Environment Programme (UNEP), International Union for Conservation of Nature (IUCN), Intergovernmental Union panel on climate change (IPCC)	
5.0		**Case Studies and Field Work**	

5	5.1	Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan, Bhopal Disaster	6
	5.2	Field visits to identify local/regional environmental issues, make observations including data collection and prepare a brief report.	
	5.3	Documentation of campus biodiversity.	
	5.4	Campus environmental management activities such as solid waste disposal, water management, and sewage treatment.	

Text Books

1. 1. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
2. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Rout- ledge.
3. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
4. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi

References

1. Harper, Charles L. (2017) Environment and Society, Human Perspectives on environmental Issues 6th Edition. Routledge.

2. Jackson, A. R., & Jackson, J. M. (2000). Environmental Science: The Natural Environment and Human Impact. Pearson Education.

3. Pittock, Barrie (2009) Climate Change: The Science, Impacts and Solutions. 2nd Edition. Routledge.

4. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut

5. Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future.10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13FP001	Field Project	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		
		Term Work	Min pass	Marks	Min pass	Total (Marks)
U13FP001	Field Project	50	40%	25	40	75

Course Description

This course will introduced the fundamentals of surveying measurements to provide a broad overview of the surveying instrumentation, procedures, measurement corrections and reductions, survey datum's, and computations that are required to produce a topographical map or a site plan for engineering and design projects.

Pre-requisites: -

Course Objectives

- Calculate elevation of points by various methods
- Apply knowledge of theodolite in civil engineering field
- Correlate knowledge of curve setting in in field
- Application of modern surveying instruments in field
- **Course Outcomes:** After the successful completion of the course students will able to:

- **CO1** Apply knowledge of levelling to calculate elevation of points
- **CO2** Correlate the knowledge of theodolite in surveying
- **CO3** Apply knowledge for setting out different types of curves
- **CO4** Apply knowledge of advance surveying

List of Experiments

1. Reciprocal Leveling.
2. Sensitivity of Bubble tube.
3 .Permanent adjustment of dumpy level.
4. Area measurement by Planimeter.
5 .Measurement of horizontal angles by different methods by theodolite.
6 Measurement of vertical angles, Measurement of bearing, deflection angle by theodolite.
7. Determination of tachometric constants
8 .Determination of grade of a given line.
9. Determination of area of polygon
9. Setting out of simple curves by different methods
11. Application of Total station

Field Projects:

1 Block contouring project/Tachometric Contouring

2 Theodolite traverse

3. Road Project (Min 700 m)

4. Total Station Project

Viva Voce based on above practical's and field project work

References	
1	Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill, 2004..
2	Kanetkar .T.P,"Surveying and Levelling," Vols. I and II, United Book Corporation, Pune, 2007.
3	Punmia .B.C,"Surveying," Vols. I and II, Laxmi Publications,2006
4	Surveying and Levelling - N.N. Basak, Tata Mcgraw Hill, New Delhi
5	Arora K.R., Surveying Vol I & II, Standard Book house , 10th Edition 2008.

Internal Assessment (T1, T2 and FET)

7. T1 (Test 1) should be based on first two modules and T2 (Test 2) should be based on next two modules, for 10 marks each..
8. FET shall be assessed for 5 marks separately.

End Semester Examination

16. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
17. The duration of end semester examination shall be Two hours.
18. The students need to solve all questions.
19. Question No.1 will be compulsory and based on entire syllabus.
20. Remaining question (Q.2 to Q.5) will be selected from all the modules

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Semester IV

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC401	Fluid Mechanics	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U13PC401	Fluid Mechanics	10	10	5	25	40%	50	40%	75

Course Description

This course is about fluid and its properties. Fluid statics will be dealt with detail. Pre-requisites for this course are courses from mathematics and engineering mechanics. This course also deals with open channel hydraulics.

Pre-requisites: Engineering Mechanics, Engineering Mathematics I, II.

Course Objectives

- Understand concept of basic properties of fluid, dynamics and kinematics
- Discuss various principles like Bernoulli's theorem, continuity equation, impulse momentum equation
- Explain concept of open channel flow and applications of pumps and turbines

Course Learning Outcome(s) *At the end of this course students will able to:*

CLO1 Recognize[2] the processes and science of fluids

CLO2 Discuss[2] the basic concepts and principles in fluid statics, fluid kinematics and fluid dynamics with their applications in fluid flow problems

CLO3 Explain[2] the concept of Open channel flow and concept of rapidly varied flow

CLO4 Demonstrate[2] application of various types of turbines and pumps

Course Contents

Module	Unit	Description	Hours
1.0		**Basic properties of fluids and Fluid Statics**	**9**
1	1.1	**Basic properties of fluids:** Physical Properties of Fluids, Newtons law of viscosity, Types of Fluids.	
	1.2	**Fluid Statics:** Types of Pressure, Pascal's Law, Hydrostatic Law, Pressure Measurement Devices, Pressure Head, Pressure Diagram, Centre of Pressure, Forces on Plane and Curved Surfaces, introduction to buoyancy and floatation	
2.0		**Fluid Kinematics and Fluid Dynamics**	**9**
2	2.1	**Fluid Kinematics:** Types of Flows, Stream lines, Equipotential lines, Steak Line, Path Line, Stream Tube, Stream Bundle, Stream Function and Velocity Potential Function, Flow Net- (Properties and Uses), Continuity Equation (3-D Cartesian Form only)	
	2.2	**Fluid Dynamics:** Forces Acting on Fluid in Motion, Euler's Equation along a Streamline, Bernoulli's Theorem, Limitations. Bernoulli's Applications: Venturimeter (Horizontal and Vertical), Orificemeter, Pitot tube, Orifices, Concept of HGL and TEL	
3.0		**Flow through pipes**	**9**
3	3.1	**Major Losses:** Reynold's Experiment, Darcy-Wiesbach Equation, Hazen Poisulle's Equation, Introduction to Moody's Chart and Nomograms.	
	3.2	**Minor losses**: Minor losses in pipes, concept of equivalent pipe, Dupit's Equation, introduction to siphon.	
4.0		**Open Channel Hydraulics**	**9**
4	4.1	**Gradually Varied Flow (GVF) and Rapidly Varied Flow (RVF):** Definition, Classification of Channel Slopes, Dynamic Equation of GVF	

		(Assumption and Derivation), Classification of GVF Profiles- Practical Examples, Direct Step Method of Computation of GVF Profiles **Rapidly varied flow (R.V.F.):** Definition, examples, Hydraulic jump- Phenomenon, relation of conjugate depths, Parameters, Uses, Types of Hydraulic jump. Hydraulic jump as an energy dissipater	
	4.2	**Uniform flow through open channel:** Introduction, Difference between Pipe Flow and Open Channel Flow, Types of Open Channels, Types of Flows In Open Channel, Geometric Elements, Velocity Distribution, Steady and Uniform Flow: Chezy's and Manning's Formula, Uniform Flow Computations, Hydraulically Efficient Section (Rectangular, Triangular, Trapezoidal)	
	4.3	Depth Energy Relationship in Open Channel Flow: Specific Energy (Definition and Diagram, Critical, Sub-Critical, Super-Critical Flow), Specific Force (Definition and Diagram)	
5.0		**Notches & Weirs, Impact of Jet, Pumps and Turbines**	**9**
5	5.1	**Notches and Weirs**: Types, Discharge Equation, Velocity of Approach, Francis Formula, Errors in Measurement of Discharge, Sharp, Broad and Round Crested Weirs.	
	5.2	**Impact of Jet:** Impact of Jet: Impulse Momentum Principle, Impact of Jet on Vanes- Flat, curved (Stationary and Moving)	
	5.3	**Pumps and Turbines:** Classification of Turbines- Pelton, Francis and Kaplan Turbine, Definitions of unit Quantities, specific speed, selection of type of Turbine, Concept of Draft Tube.	

Text Books

1. Modi. P. M. and Seth S. N., "Fluid mechanics & hydraulics", 10th Edition, Standard Publications (2015).
2. R. K. Bansal, "Fluid mechanics & hydraulics", 14th Edition, Khanna publications (2009).

References

1. A. K. Jain, "Fluid Mechanics" 2nd Edition, Khanna Pub., Delhi (2015).
2. Garde R. J. and Mirajgaonkar A. G., Engineering Fluid Mechanics, Tata Mcgraw Hill.
3. R. J. Garde, Fluid Mechanics Through Problems, Tata Mcgraw Hill
4. Rangaraju, "Open Channel flow", Tata McGraw-Hill Pub. Co., Delhi
5. Streeter, "Fluid Mechanics", McGraw-Hill International Book Co., Auckland
6. K. L. Kumar, "Fluid Mechanics", Eurasia Publication House, Delhi

Internal Assessment (T1, T2 and FET)

3. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
4. FET shall be assessed for 5 marks separately.

End Semester Examination

6. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
7. The duration of end semester examination shall be Two hours.
8. The students need to solve all 5 questions.
9. Question No.1 will be compulsory and based on entire syllabus.
10. Remaining question (Q.2 to Q.5) will be selected from

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC402	Geotechnical Engineering	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U13PC402	Geotechnical Engineering	10	10	5	25	40%	50	40%	75

Course Description

Geotechnical Engineering I/ Soil Mechanics deals with study of physical properties of soils, and the relevance of these properties as they affect soil strength, stability, and drainage. Geotechnical Engineering deals with selection of foundation type based on building site conditions and site constraints, determining size and reinforcement of the foundation and finally construction of foundation element.

Pre-requisites: Engineering Mechanics, Engineering Mathematics I, II.

Course Objectives

- Understand concept of soil and its physical, index and engineering properties
- Discuss various concepts like earth pressure, slope stability
- Design shallow and deep foundations

Course Learning Outcome(s) *At the end of this course students will able to:*

CLO1 **Explain**[2] index properties of soil and **Determine**[2] Permeability and Seepage of given soil

CLO2 **Explain**[2] compaction and consolidation behaviour of soil, **Calculate**[3] Stresses and stress distribution in Soil and **Calculate**[3] shear strength of soil and earth pressure in soils, **Identify**[1] different types of rocks

CLO3 **Identify**[2] the investigation plan to explore the subsurface, **Discuss**[3] different types of shallow foundations and design those. Predict the possible settlement of foundations

CLO4 **Explain**[2] well foundation, caissons, sheet piles and coffer dams

Course Contents

Module	Unit	Description	Hours
1.0		**Basic soil properties and Permeability**	**9**
1	1.1	**Soil, its properties and basic relationships:** soil & soil structure, soil phase system, weight volume relationships, index properties of soil - unit weight, water content, specific gravity, void ratio, porosity, air content, degree of saturation and their relationships and its significance, particle size analysis (introduction to mechanical analysis and wet mechanical analysis), I. S. classification of soil, Cassagrande's Plasticity chart, soil consistency and indices.	
	1.2	**Permeability and Seepage**: Darcy's law, Factors affecting permeability, introduction to Determination of coefficient of permeability by constant head, falling head method pumping in test and pumping out test. Permeability of layered soils Seepage forces, Laplace equation, Flow net construction and applications for determination of seepage, Concept of effective neutral & total stress in soil mass., quick sand condition.	
2.0		**Compaction and Consolidation**	**9**
2	2.1	**Compaction:** phenomenon. Factors affecting compaction, Dry density and moisture content relationship. Zero air voids line. Effect of compaction on soil structure, Standard Proctor test and Modified Proctor test as per IS – 2720. Field compaction equipment and methods, Field control of compaction	
	2.2	**Consolidation**: Spring analogy, Terzaghi's theory of 1-D consolidation, Lab consolidation test; c_c, c_v, m_v and a_v Determination of coefficient of consolidation-square root of time fitting	

		method and logarithm of time fitting method. normally consolidated and over consolidated soils, Determination of pre-consolidation pressure	
3.0		**Shear strength and Earth Pressure**	**9**
3	3.1	**Shear Strength:** Concept of shear stress and shear strength, Coulomb's theory and failure envelope, Total stress approach and effective stress approach, representation of stresses on Mohr's circle, Mohr-Coulomb's envelope for different types of soil such as c soil, phi soil and c-phi soil, Determination of Shear Strength: type of test - box shear test (UU, CU, CD), triaxial compression test (UU, CU, CD) unconfined compression test, vane shear test.	
	3.2	**Earth Pressure**: Concept, Area of application, earth pressure at rest, active and passive condition. Rankines theory of earth pressure - dry/moist, submerged (partially and full), horizontal backfill with surcharge	
4.0		**Soil Exploration, Bearing capacity of foundations and Shallow foundations**	**9**
4	4.1	Necessity, Planning, No & depth of bore holes, Exploration Methods (auger boring (hand and continuous flight augers), and wash boring, rotary drilling. Soil sampling (disturbed and undisturbed)	
	4.2	Definitions, Modes of failure, Terzaghi's bearing capacity theory, I.S. Code method of bearing capacity evaluation & computation (IS 6403), Effect of various factors on bearing capacity (Size & Shape, Depth, WT, Eccentricity), Bearing capacity evaluation from Plate load test, S.P.T. (By I.S. Code method) and pressure meter tests with detailed procedure	
	4.3	Types and their selection, minimum depth of footing, Assumptions & limitations of rigid design analysis. Design of Isolated, combined, strap, footing (Rigid analysis), Raft foundation (elastic analysis), floating foundations (R.C.C. Design is not expected) Foundation Settlement: computations from I.S. 8009 (1976 (Part I) approach,	

		consolidation, Settlement computations, Concept of total settlement, differential settlement and angular distortion	
5.0		**Deep Foundations and slope stability**	**9**
5	5.1	Classification and their uses, single pile capacity evaluation by static and dynamic methods, pile load test. Negative skin friction, Group action piles, spacing of piles in a group, Group efficiency. Under reamed piles – equipment, construction and precautions	
	5.2	Element of wells, types, methods of construction, tilt and shift, remedial measures, Pneumatic caissons: sinking method (Sand island method, Caisson disease. Types and material used for sheet piling, Common types of cofferdams, Soil pressure distribution, Braced cofferdam	
	5.3	Slope classification, slope failure, modes of failure. Infinite slope in cohesive and cohesion less soil, Taylor's stability number, Swedish slip method and concept of Friction circle method, Landslides	

Text Books

1. K. R. Arora, "Soil Mechanics and Foundation Engineering" Standard Publication.
2. Punmia, B. C., Jain A. K., and Jain A. K Soil Mechanics and Foundations, Laxmi Publications.

References

1. Alam Singh, "Text book of soil mechanics in theory and practice" Asian Publishing House, Bombay.
2. N. S. Murthy, "Soil mechanics and Foundation engineering" by V., U. B. S. Publishers and distributors New Delhi.
3. B. C. Punmia, "Soil mechanics and Foundation engineering", A Saurabh and Company Pvt. Ltd., Madras.
4. P. Purushottam Raj, "Geotechnical Engineering", Tata Mcgraw Hill Company Ltd. New Delhi
5. Terzaghi and Peak, "Soil mechanics", John Willey and Sons, New- York.

6. T.W. Lambe, “Soil Testing”, Willey Eastern Ltd., New Delhi.

Internal Assessment (T1, T2 and FET)

5. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
6. FET shall be assessed for 5 marks separately.

End Semester Examination

11. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
12. The duration of end semester examination shall be Two hours.
13. The students need to solve all 5 questions.
14. Question No.1 will be compulsory and based on entire syllabus.
15. Remaining question (Q.2 to Q.5) will be selected from all the modules.
16. all the modules.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC401	Theory of Structures	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U13PC401	**Theory of Structures**	10	10	5	25	40%	50	40%	75

Course Description

This includes analysis of determinate and indeterminate structures Continuous beams, portal frames and plane frame. This course is divided into six units having different methods for analysis for indeterminate structures and interprets the output of different methods.

Pre-requisites: Engineering Mechanics, Structural Mechanics, Engineering Mathematics I, II.

Course Objectives

- Understand concept of basic properties and behaviour of steel and concrete material
- Discuss various principles like St. Venant principle, Principle of superposition, Work-energy principle, Virtual work principle, Equilibrium conditions,
- Understand different indeterminate structures methods of analysis like Energy method, Flexibility method, Stiffness methods, Direct stiffness method, Finite element method

Course Learning Outcome(s) *At the end of this course students will able to:*

CLO1 **Illustrare[2]** concept of Principle stress and strain and its graphical method

CLO2 **Analyze[3]** determinate beam by slope deflection method

CLO3 **Analyze[3]** indeterminate beams/frames by Clapeyron's theorem of three moment method

CLO4 **Analyze[3]** indeterminate beam by slope deflection and moment distribution method

Course Contents

Module	Unit	Description	Hours
1.0		**Principal stress and strain**	**9**
1	1.1	Principle stress in two dimensions, Introduction to graphical method.	
	1.2	Principal stress in beams and thin cylinders	
2.0		**Slope – deflection of determinate beams**	**9**
2	2.1	Double in integration method, Macaulay's method,	
	2.2	Moment-area method and conjugate beam method.	
3.0		**Force Method:** Clapeyron's theorem	**9**
3	3.1	Clapeyron's theorem of three moments, analysis of continuous beam	
	3.2	Beam with sinking of support and variation of EI.	
4.0		**Displacement method :** Slope deflection equation method	**9**
4	4.1	Slope deflection equation method, modified slope deflection equation, analysis of beam	
	4.2	Analysis of beam with sinking of support, variation of EI, Analysis of non-sway frame.	
5.0		**Displacement method:** Moment distribution method	**9**
5	5.1	Moment distribution method, carry over factor, distribution factor, analysis of beam	
	5.2	Analysis of beam with sinking of support, variation of EI, Analysis of non-sway and sway frame	

Text Books

1. Reddy C. S., Basic Structural Analysis, Tata Mc Graw Hill Publications.
2. B. N. Thadani, J. P. Desai, Structural Analysis – A Matrix Approach, Asia Publishing house, Mumbai.

References

1. S. Ramamrutham, R. Narayan, Theory of structures, Danapat Rai publishing company Pvt.Ltd
2. Vazirani & Ratwani, Analysis of Structure, Vol. II, Khanna Publications, New Delhi.
3. Pandit& Gupta, Structural Analysis a Matrix Approach, Tata McGraw Hill Publising Ltd.
4. Negi & Jangid, Structural Analysis, TataMcGraw Hill
5. "Structural Analysis" - Bhavikatti S.S, Vikas Publications house New Dehli

Internal Assessment (T1, T2 and FET)

7. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
8. FET shall be assessed for 5 marks separately.

End Semester Examination

17. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
18. The duration of end semester examination shall be Two hours.
19. The students need to solve all 5 questions.
20. Question No.1 will be compulsory and based on entire syllabus.
21. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U01EM002	Engineering Management	02	-	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U01EM002	Engineering Management	-	10	5	15	40%	35	40%	50

Course Description

This course presents the principles and techniques of managing engineering projects from the initiation phase, through planning, execution, control and closeout. Students will develop the analytical skills and awareness necessary on the management side of engineering projects.

Pre-requisites: -

Course Objectives

- Understand the importance of management in engineering field.
- Apply knowledge of project management
- Understand the concept of material management.
- Explain importance of quality management
- **Course Outcomes:** After the successful completion of the course students will able to:
- **CO1** Explain function of principles of management.
- **CO2** Correlate knowledge of project management to various engineering project
- **CO3** Apply knowledge of material management
- **CO4** Explain importance of quality management in engineering field.

Course Contents

Module	Unit	Description	Hours
1.0		**Introduction To Management**	**06**
1	1.1	Principles of Management (Henry Fayol) Functions of Management: Planning- Organizing ,Staffing Directing Supervision, Co-ordination, Communication, Motivation, Leading Controlling –Decision Making: Process, introduction to decision tree	
2.0		**Project Management**	**06**
2	2.1	Introduction, Need for Project Management, , The Project Life Cycle, Phases of Project Management, need of project management , Role of Project Manager (PM), Work Breakdown Structure (WBS)	
	2.2	Project Planning- Time Management, Tools for time management Bar Chart/ Gantt Charts, Mile stone chart- representation, uses, progress monitoring.	
3.0		**Project Control-**	**06**
3	3.1	Network analysis- Basic definition application, rules for drawing networks Critical Path Method (CPM)-Development of CPM Network Time Estimates, Calculations of Floats, Critical Path.	
	3.2	Programme Evaluation Review Techniques (PERT)- Time Estimates, Slack calculation , Probability of Project Completion.	
4.0		**Project Monitoring**	**06**
4	4.1	Project Network Updating, - introduction, process, data required for updating, steps in updating application	
	4.2	Cost Control- introduction, project cost. Crashing/compression of network. Application	

5.0		**Material Management and Quality Control**	**06**
5	5.1	Objectives, Need for Inventory Control, EOQ Analysis, ABC analysis, Safety Stock, Purchase Procedure, Stores Record , site layout	
	5.2	Quality Management: Importance, Quality Circle, ISO 9000, QA, QC, QMS –Purpose	

References	
1	Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGraw Hill Publishing Company, New Delhi, 1998.
2	Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015.
3	Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publication

Internal Assessment (T1, T2 and FET)

9. T2 should be based on First to Fourth modules, for 10 marks.
10. FET shall be assessed for 5 marks separately.

End Semester Examination

21. Question paper will be of 35 marks comprise of 5 questions, each carrying 07 marks
22. The duration of end semester examination shall be Two hours.
23. The students need to solve all questions.
24. Question No.1 will be compulsory and based on entire syllabus.
25. Remaining question (Q.2 to Q.5) will be selected from all the modules

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
U13VS401	Software Proficiency	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		02	-	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
U13VS401	Software Proficiency	T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
		-	10	5	15	40%	35	40%	50

Course Description:
This course requires the student to know about the basic of civil engineering, structural analysis, force, loads acting on structure, structural design procedure etc.

Course Learning Outcome(s)	
At the end of this course students will able to:	
CLO1	**Know**^{2} and defining details input in software by using software language.
CLO2	An ability to work in one or more significant application domains.
CLO3	Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
CLO4	Demonstrate an ability to use the techniques and tools necessary for engineering practice.

UNIT	DESCRIPTION	HOURS
I	AutoCAD is computer-aided design software that is used to create, modify, analyses and optimize a design. Students will learn that this software is used by architects, engineers, and for the construction purpose of generating 2D and 3D designs. • Installing the application on the computer • Learning about the user interface of AutoCAD, such as panels, ribbon, model space, etc. • Understanding the setup tips of AutoCAD • Types and structures of drawings in AutoCAD	4

	• Learning basic drawing tools	
II	In this subject, students will learn about the objects used for drawing purposes, such as lines, polylines, constructed lines, polygons, rectangles, circles, arcs, ellipses, etc. These toolbars are used to create 2-dimensional drawings. Some other parts of the syllabus are: • Understanding the concept of drawing a toolbar • Learning about line command, polyline command, and circle command • Understanding the concept of other commands • Arc command • Text and rectangle command	4
III	Students will learn about the cartesian coordinate system. This system is defined with the help of a pair of perpendicular lines, a single unit of length for both axes, and an orientation for each axis. It is also called a rectangular coordinate system and an orthogonal coordinate system. Some other parts of the syllabus are: • Developing different designs • Methods of developing title block • Setting up attributes • Set up layers of industry standards • Development of plans and elevations	4
IV	The commands are used for passing information to the initial point of the task; the information is only communicated between running programs. There are many restrictions attached to modifying commands. Some other parts of the syllabus are: • Use of erase commands • Selection of multiple objects • Move and copy command • The distance method • The two points method • Trim and extend	4
V	Students will learn to identify the text commands and layers. There are two text commands used in the AutoCAD multiline text and single-line text. The two commands for layers are laid on and layoff. Some other parts of the syllabus are: • Understanding the concept of creating, renaming, and removing layers • Specifying the default properties • Sort, filter, and group layers names • Dimension objects • Layers visibility	4
VI	The students will learn about the various fundamentals of 2D in AutoCAD. The 2D fundamentals are an exploration of a variety of contemporary processes and techniques used in drawing in the wide array of drawing media.	4

	Some other parts of the syllabus are: • Understanding the AutoCAD workspace and user interface • Organizing drawing objects in layers • Using basic drawing, editing, and viewing tools • Preparing a layout to be plotted	
VII	There are mainly four commands used in the AutoCAD for geometric constructions, which are explained below. Some other parts of the syllabus are: • Construction on commands • Point commands • Ray commands • XLINE commands	4
VIII	Students will learn about the concept of elevation in this subject. An elevation is an image that shows the height, length, and width of a particular building. It is prepared for the purpose of giving an idea about the look of the finished product.	2

Laboratory Work

Lettering, Symbols, Types of lines and dimensioning as per IS 962

1 Drawing to a scale, draw on half imperial drawing sheet.

A) Brick masonry: English bond, Flemish bond, rat trap bond.

B) Stone Masonry: UCR, Course Rubble

C) Doors: T.W. Panelled Door.

D) Windows: T.W., Glazed and aluminium Window.

2 Measurement drawing

a) Imperial size sheet based on actual measurement of existing residential building consisting of plan, elevation, section passing through staircase. Site plan. Area statement and brief specifications (G+1 building and minimum 5 rooms, Measurement drawing should be done in group of maximum 5 students).

b) Site visit along with report.

3 Planning and design of residential building /commercial building (G+1). (Using Auto Cad)

a) Municipal Submission drawing.

b) Working Drawings- Foundation / Centre Line Drawing., Furniture layout plan,

Electrification plan, Water supply and drainage plan.

Course Code U13VS401	Course Title **Software Proficiency** (Program Core | School of Technology)

L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
-	-	4	2	Theory and Practical	FA	100	40%	40%
							40%	

Course Description:
This course requires the student to know about the basic of civil engineering, structural analysis, force, loads acting on structure, structural design procedure etc.

Course Learning Outcome(s)	
At the end of this course students will able to:	
CLO1	**Know**[2] and defining details input in software by using software language.
CLO2	An ability to work in one or more significant application domains.
CLO3	Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
CLO4	Demonstrate an ability to use the techniques and tools necessary for engineering practice.

UNIT	DESCRIPTION	HOURS
I	AutoCAD is computer-aided design software that is used to create, modify, analyses and optimize a design. Students will learn that this software is used by architects, engineers, and for the construction purpose of generating 2D and 3D designs. • Installing the application on the computer • Learning about the user interface of AutoCAD, such as panels, ribbon, model space, etc. • Understanding the setup tips of AutoCAD • Types and structures of drawings in AutoCAD • Learning basic drawing tools	4
II	In this subject, students will learn about the objects used for drawing purposes, such as lines, polylines, constructed lines, polygons, rectangles, circles, arcs, ellipses, etc. These toolbars are used to create 2-dimensional drawings. Some other parts of the syllabus are: • Understanding the concept of drawing a toolbar	4

	• Learning about line command, polyline command, and circle command • Understanding the concept of other commands • Arc command • Text and rectangle command	
III	Students will learn about the cartesian coordinate system. This system is defined with the help of a pair of perpendicular lines, a single unit of length for both axes, and an orientation for each axis. It is also called a rectangular coordinate system and an orthogonal coordinate system. Some other parts of the syllabus are: • Developing different designs • Methods of developing title block • Setting up attributes • Set up layers of industry standards • Development of plans and elevations	4
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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC404	Fluid Mechanics Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		
		Term Work	Min pass	Marks	Min pass	Total (Marks)
U13PC404	Fluid Mechanics Lab	25	40%	-	-	25

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Calculate**[3] discharge of fluid through pipe, orifices and in open channel.
- **CO2** **Estimate**[3] the major and minor losses in pipe.
- **CO3** **Estimate**[3] the various elements and energy losses in hydraulic jump.

List of Experiments

1. Measurement of Discharge and Study of Pressure Measuring Devices
2. Verification of Bernoulli's Theorem
3. Calibration of Venturi meter and orifice meter
4. Reynold's Experiment
5. Establishment of uniform flow in open channel
6. Calibration of V-Notch / Rectangular Notch
7. Study of Flow over Weirs
8. Impact of Jet

References

1. Modi. P. M. and Seth S. N., "Fluid mechanics & hydraulics", 10th Edition, Standard Publications (2015).
2. R. K. Bansal, "Fluid mechanics & hydraulics", 14th Edition, Khanna publications (2009).

Evaluation Scheme

4. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
5. The grades will be converted to marks as per ‘credit and grading system’ manual and should be added and averaged.
6. Based on above scheme grading and TERM WORK assessment should be done.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U13PC405	Geotechnical Engineering Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		
		Term Work	Min pass	Marks	Min pass	Total (Marks)
U13PC405	Geotechnical Engineering Lab	25	40%	-	-	25

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Explain**[2] index properties of soil
- **CO2** **Determine**[2] Permeability and Seepage of given soil
- **CO3** **Explain**[2] compaction and consolidation behaviour of soil
- **CO4** **Calculate**[3] shear strength of soil

List of Experiments

1. Determination of water content by oven drying.
2. Specific gravity determination by pycnometer / density bottle.
3. Particle size distribution-Dry Mechanical sieve analysis
4. Particle size distribution-hydrometer analysis
5. Determination of consistency limits (minimum 2- LL, PL, SL) and its use in soil classification.
6. Field density test by core cutter
7. Field density test by sand replacement method
8. Determination of co-efficient of permeability by variable head method.
9. Standard proctor test/ Modified proctor test.
10. Direct shear test – CD
11. Unconfined Compression Test
12. Triaxial shear test

References

1. K. R. Arora, "Soil Mechanics and Foundation Engineering" Standard Publication.

Evaluation Scheme

7. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
8. The grades will be converted to marks as per 'credit and grading system' manual and should be added and averaged.
9. Based on above scheme grading and TERM WORK assessment should be done.

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