SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

CIVIL ENGINEERING

Syllabus for

T.E. (Civil Engineering) w. e. f. Academic Year 2018-19
Choice Based Credit System (CBCS)

SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY
Civil Engineering

Programme Educational Objectives and Outcomes

A. Program Educational Objectives (PEOs)

The Program Educational Objectives for Civil Engineering program are designed to produce competent Civil engineers who are ready to contribute effectively to the advancement of Civil Engineering and to fulfill the needs of the community. These objectives are as follows:

The Program Educational Objectives are as follows:

1. Graduate will excel in professional career in various specializations of Civil engineering and allied interdisciplinary areas.

2. Graduate will exhibit strong fundamentals required to pursue higher education and continue professional development in Civil and other fields.

3. Graduate will adhere to professional ethics; develop team spirit and effective communication skills to be successful leaders with a holistic approach.

4. Graduate will be sensitive to societal and environmental issues for sustainable development while doing their professional work.

Programme Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

1. Graduates will be able to survey, conduct geo-technical investigations, plan, analyse, design, estimate and construct residences, public buildings, industrial buildings, townships and infrastructural projects by adopting appropriate construction methods.
2. Graduates will analyse and prepare sustainable designs for various water resources systems, and municipal & industrial waste treatment plant/s ensuring pollution free environment.
3. Graduates will be able to use appropriate application software, develop skills necessary for professional practice and prepare themselves for competitive examination for higher education and for public service commissions.

SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Engineering & Technology

Credit System structure of T. E. Civil-I, Semester- V, (Revised from 2018-2019)

Course code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CV-311	Design of Steel Structures	3	-	-	-	3	30	70		-	100
CV-312	Geotechnical Engg.-I	3	-	-	-	3	30	70		-	100
CV-313	Environmental Engg.-I	3	-	-	-	3	30	70		-	100
CV-314	Water Resources Engg. II	3	-	-	-	3	30	70		-	100
CV-315	Transportation Engg.-I	3	-	-	-	3	30	70		-	100
SLH-31	Self Learning (H.S.S. course)	-		-	-	2	-	50		-	50
	Total	**15**				**17**	**150**	**400**		**-**	**550**
	Laboratory/Drawings							**POE**	**OE**		
CV-311	Design of Steel Structures	-	-	2	-	1	-	-	-	25	25
CV-312	Geotechnical Engg.I	-	-	2	-	1	-	25	-	25	50
CV-316	Building Planning & Design using CADD	1	-	-	4	3	-	-	25	50	75
CV-313	Environmental Engg.I	-	-	2	-	1	-	-	-	25	25
CV-314	Water Resources Engg. II	-	-	2	-	1	-	-	25	25	50
CV-315	Transportation Engg.-I	-	-	2	-	1	-		-	25	25
	Total	**-**	**-**	**10**	**4**	**8**	**-**	**75**		**175**	**250**
	Grand Total	**16**		**10**	**4**	**25**	**150**	**475**		**175**	**800**

Abbreviations: L: Lectures, P: Practical, T: Tutorial, D: Drawing. ISE: In Semester Examination Tests, ESE: End Semester Examination - University Examination (Theory &/ POE &/Oral examination), ICA: Internal Continuous Assessment.

Note:

1) Students shall undergo a field training of total 30 days in two phases including at least 15 days in the winter vacation after T.E. Civil Part -I and at least 15 days in summer vacation after T.E. Civil Part-II. They shall submit the field training report of the first phase to the faculty associated with subject Engineering Management- I in their T.E. Part-II. They shall submit field training report of the second phase to concerned 'Project' guides in B.E. Part-I.

2) Internal Continuous Assessment (ICA) shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, syllabus, report presentation etc., as applicable.

3) The batch size for the practical/tutorial is of 15 students. On forming the batches, if the number of remaining students exceeds 7, then a new batch be formed.

4) Curriculum for Humanities and Social Sciences (HSS) Self Learning Courses is common for all under graduate programmes of Faculty of Engineering and Technology.

5) For self Learning at T.E. Civil Part I –

A. Student shall select a 'Self Learning Course' from Solapur University, Solapur 'HSS Course List' and appear for its examination as and when conducted by Solapur University, Solapur.
Minimum four assignments for Self Learning Modules at T. E. Part I shall be submitted by the students which shall be evaluated by a 'Module Coordinator' assigned by institute / department.

OR

B. Student with prior approval of the institute shall select and enroll for 'National Programme on Technology Enhanced Learning (NPTEL)' course from HSS domain with minimum eight weeks duration, complete necessary assignments and appear for certificate examination as per the NPTEL schedule during respective semester.
For more details about Self Learning Course (HSS) please refer to separate rule document available from Solapur University, Solapur. More details about NPTEL are available at http://nptel.ac.in

SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Engineering & Technology

Credit System structure of T. E. Civil-II, Semester - VI, W. E.F. 2018-2019

Course code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CV-321	Structural Mechanics-III	3	-	-	-	3	30	70		-	100
CV-322	Geotechnical Engg.II	4	-	-	-	4	30	70		-	100
CV-323	Environmental Engg.II	3	-	-	-	3	30	70		-	100
CV-324	Engineering Management- I	3	-	-	-	3	30	70		25	125
CV-325	Elective-I	3	-	-	-	3	30	70		-	100
CV-326	Self Learning (Technical course)	-	-	-	-	2	-	50		-	50
	Total	**16**	**0**	**-**	**-**	**18**	**150**	**400**		**25**	**575**
	Laboratory/Drawings:						-	**POE**	**OE**		
CV-321	Structural Mechanics-III	-	-	2	-	1	-	-	-	25	**25**
CV-322	Geotechnical Engg.II	-	-	2	-	1	-	-	-	25	**25**
CV-323	Environmental Engg.II	-	-	2	-	1	-	-	25	25	**50**
CV-325	Elective-I	-	-	2	-	1	-	-	-	25	**25**
CV-327	Project on Steel Structures	-	-	-	4	2	-	-	25	50	**75**
CV-328	Mini Project in SM-III/GE-II/EE-II/EM-I using Application Software	-	-	2		1				50	**50**
CV-329	Assessment of field training report	-	-	-	-	1				25	**25**
	Total	**-**	**-**	**10**	**4**	**8**			**50**	**225**	**275**
	Grand Total	**16**	**0**	**10**	**4**	**26**	**150**	**450**		**250**	**850**

Abbreviations: L: Lectures, P: Practical, T: Tutorial, D: Drawing, ISE: In Semester Examination Tests, ESE: End Semester Examination - University Examination (Theory &/ POE &/Oral examination), ICA: Internal Continuous Assessment.

Note:

1) Student/s shall carry out 'Mini Project' in any one of the following subjects: Structural Mechanics-III, Geotechnical Engg. II, Environmental Engg. II or Engineering Management-I by preferably employing relevant application software. The Mini project shall be assessed by the domain subject teachers for ICA.

2) Students shall undergo a field training of total 30 days in two phases including at least 15 days in the winter vacation after T.E. Civil Part I and at least 15 days in summer vacation after T.E. Civil Part-II. They shall submit the field training report of the first phase to the faculty associated with subject Engineering Management- I in their T.E. Part-II. They shall submit field training report of the second phase to concerned 'Project' guides in B.E. Part-I.

3) Internal Continuous Assessment (ICA) shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, syllabus, report presentation etc., as applicable.

4) The batch size for the practical/tutorial is of 15 students. On forming the batches, if the number of remaining students exceeds 7, then a new batch be formed.

5) For Self Learning at T.E. Civil Part II -

A. Student shall select a 'Self Learning Technical Course' from Solapur University, Solapur Technical Course List (Civil Engineering) and appear for its examination, as and when conducted by Solapur University, Solapur. Minimum four assignments for Self Learning Modules at T.E. Part II shall be submitted by the students which shall be evaluated by a Module Coordinator assigned by institute / department.

OR

B. Student with prior approval of the institute shall select and enroll for any 'National Programme on Technology Enhanced Learning (NPTEL)' course from Civil Engineering domain/Interdisciplinary course, with minimum eight weeks duration, complete necessary assignments and appear for certificate examination as per the NPTEL schedule during respective semester.

More details about NPTEL are available at http://nptel.ac.in

LIST OF ELECTIVE SUBJECTS (CV-325)

T. E. Civil Part-II	
ELECTIVE I	
1	Advanced Design of Steel Structures
2	Industrial Waste Treatment
3	Water Power Engineering
4	Advanced Concrete Technology
5	Reliability Engineering
6	Finite Element Method
7	Experimental Stress Analysis
8	Optimization Techniques
9	Disaster Management

T.E. (CIVIL ENGINEERING) PART- I

CV- 311 DESIGNS OF STEEL STRUCTURES

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks (**Duration** -4 Hrs)

Course Objectives

1. To introduce philosophy of 'Limit State Approach', for Design of Steel Structures.
2. To estimate magnitudes of various types of loads on steel structures for strength and serviceability conditions with appropriate load combinations
3. To acquaint students with design procedures of bolted & welded connections, tension members, compression members, columns, column bases and beams by Limit State Method
4. To acquaint students, with the basic concepts of plastic analysis

Course Outcomes

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

1. Select various load combinations acting on steel structural elements and choose appropriate ones using 'Limit State' design approach for designing various elements of steel structures for strength and serviceability
2. Analyze and Design various steel structure elements viz. Bolted and welded connections, Tension members Compression members as per relevant IS Code provisions
3. Design a Column / built up column using lacing and battening
4. Analyze beams and portal frames by plastic analysis approach
5. Analyze and Design a Roof truss, and choose appropriate sections for different elements.
6. Design a Beam, column base as per relevant IS Code provisions

SECTION I

UNIT 1: Introduction to Design of Steel Structures (05)

a) Advantages and disadvantages of steel structures, permissible stresses, factor of safety, methods of design, types of connections, various types of standard rolled sections, types of loads and load combination.

b) Types of steel structures, grades of structural steel, relevant IS specifications such as IS: 800-2007, IS: 808-1989, IS: 875 part I to III, SP: 6(1), SP: 6(6), IS: 4000-1992, codes for welded connections.

c) Philosophy of limit state design for strength and serviceability, partial safety factor for load and resistance, various design load combinations, classification of cross section such as plastic, compact, semi-compact and slender.

UNIT 2: Tension Members (06)

Various cross sections such as solid threaded rod, cable and angle sections, net effective area of bar, angle, tees and flats, Limit strength due to yielding, rupture and block shear, Load carrying capacity, Design of tension member, connections of member with gusset plate by bolts and welds, Design of tension splice.

UNIT 3: Compression Members-Struts (05)

Common sections used in trusses, buckling classification as per geometry of cross section, buckling curves, effective length and slenderness ratio, permissible stresses, Load carrying capacity, design of struts, connections of members with gusset plate by bolts and welds.

UNIT 4: Columns (06)

Simple and built up section, Design of built-up column, lacing and battening, connection of lacing/battening with main components by bolts and welds, column subjected to axial force and bending moment, column splices, design of eccentrically loaded column subjected to uniaxial bending (check for section strength only), design of beam to column connections using bolt / weld.

SECTION II

UNIT 5: Introduction to Plastic Analysis for Beams and Portal Frames (07)

Plastic moment, moment curvature relationship, plastic hinges, yield spread in section, shape factor for cross-sections, theorem of plastic analysis, mechanisms, collapse load, complete, partial and over complete collapse, application of virtual work method to beams and portal frames.

UNIT 6: Beams (07)

Laterally supported and unsupported beams, design of simple beam, built up beams using flange plates, low and high shear, check for deflection, Curtailment of flange plates, web buckling and web crippling. Secondary and main beam arrangement for floor of building, design of beam to beam connections using bolt / weld.

UNIT 7: Roof Trusses (04)

Various component of an industrial shed, Types of trusses, load calculation and combination, design of purlins, design of members of a truss, Design of hinge and roller supports.

UNIT 8:Column Bases (05)

Column base under axial load: design of slab base, gusseted base, design of anchor bolts, design of pedestal, Column base for axial load and uniaxial bending.

Note:

Use of IS: 800-2007, IS 875, IS: Handbook No. 1 for steel section and steel table is permitted for theory examinations.

CV 311- DESIGN OF STEEL STRUCTURES (Laboratory)

INTERNAL CONTINUOUS ASSESSMENT (ICA)

It shall include at least eight assignments based on theoretical course above.

TEXT BOOKS

1. Design of Steel Structures, N. Subramanian, Oxford, 2008
2. Limit State Design of Steel Structures, S. K. Duggal.
3. Design of steel structure by Limit State Method as per IS: 800- 2007 by Bhavikatti S. S, I K International Publishing House, New Delhi
4. Limit state design in Structural Steel by Dr M. R. Shiyekar
5. Design of Steel structures by K. S. Sai Ram
6. Design of Steel structures by L. S. Jayagopal and D. Tensing

REFERENCE BOOKS

1. Limit state design of Steel Structure by V. L. Shah & Gore, Structures Publication, Pune
2. Limit State Design of Steel Structures by D. Ramchandra & Virendra Gehlot, Scientific Publishers
3. Design of Steel Structures by K. S. Sai Ram, published by Dorling Kindersley (India) Pvt. Ltd.
4. Structural Design and Drawing Reinforced Concrete and Steel by N. Krishnaraju, Universities Press (India) Pvt. Ltd. Hyderabad.
5. Teaching Resource Material by INSDAG
6. Bureau of Indian Standards, IS800-2007, IS875-1987.
7. Steel Tables SP: 6(1) and SP: 6(6)

T.E. (CIVIL ENGINEERING) PART- I

CV- 312 GEOTECHNICAL ENGINEERING–I

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE (Lab) :	25 Marks
		ESE (Theory):	70 Marks

Course Objectives

1. To provide students with basic understanding of physical and mechanical properties of soil
2. To provide hands on experience of laboratory investigation of soil to find index properties and strength properties needed for geotechnical engineering design
3. To distinguish the compaction and consolidation phenomenon and their importance in the field
4. To acquaint the students with various theories of earth pressure calculations on soil retaining structures.

Course Outcomes

By the end of this course, the student will be able to:

1. Conduct laboratory and field experiments on soil to evaluate various index and strength properties of soil
2. Apply basics principles of flow and soil permeability through porous media, to estimate the seepage through earth structures and foundations.
3. Estimate strength related properties of soil by conducting various test in the laboratory under different drainage conditions.
4. Apply one dimensional consolidation theory to estimate time-dependent settlements of foundations.
5. Calculate various types of earth pressure and their point of application on earth retaining structures.

SECTION –I

Unit 1: SOIL PROPERTIES AND CLASSIFICATION (08)

Introduction: - Definition of soil and soil engineering, soil origin, Application areas of soil mechanics, 3- phase soil system.

Index properties of soil:- Terminology used in basic soil properties (Voids ratio, Porosity, Degree of saturation, Percentage air voids, air content, different densities & unit weights) and their inter relationship, Method for determination of field density viz. Sand Replacement and Core Cutter. Specific gravity and its determination methods, Density index.

Soil consistency: - Atterberg's limits and their significance. I.S. plasticity chart for soil classification.

Soil classification: - Soil classification based on particle size and consistency, Grain size distribution by mechanical & sedimentation analysis, I.S. classification system of soil (IS : 1498-1970), soil structure and fabric.

Unit 2 : (07)

Flow of water through soil:- Permeability – head , gradient and potential , Darcy's law and its validity, Factors affecting permeability, Field and laboratory methods of determining permeability, seepage pressure, Quick sand condition, critical hydraulic gradient, Derivation of Laplace's equation, flow net and its application, Construction of flow net, Piping phenomenon, concept of total, neutral & inter granular stress.

Stress Distribution in Soil: Boussineq's Equation for point load, Vertical pressure under uniformly loaded circular area and uniformly loaded rectangular area, variation of vertical stress under point load along the vertical and horizontal plane. Pressure bulb and its significance, Newmarks's Chart.

Unit 3: SHEAR STRENGTH OF SOIL (08)

Shear strength :- Concept of shear, Mohr's - Coulomb Failure theories, failure envelope, Total stress approach, effective stress approach and pore water pressure, Representation of stresses on Mohr's circle for different types of soil such as cohesive and cohesion less in terms of total stress & effective stress, , Application of shear strength parameters in the field.

Different types of shear tests:- Unconsolidated Undrained (U-U), Consolidated Undrained (C-U) and Consolidated Drained test (C-D). Choice of type of test, Box shear test, Triaxial compression test with pore pressures and volume change measurements, Unconfined compression test, Vane shear test, Sensitivity and thixotropy of cohesive soils, factors affecting shear strength.

SECTION –II

Unit 4: SOIL COMPACTION (06)

Compaction:- Theory of compaction, factors influencing compaction, compacted density. Laboratory Standard and Modified compaction test, Method and measurement of field compaction, field compaction control.

Unit 5: COMPRESSIBILITY AND COMPACTION (08)

Compressibility:- Definition, compressibility of laterally confined soil, compression of sand and clay, e – p curve, e- log p curve, compression index

Consolidation:- Basic terminology , Terzaghi's theory of one dimensional consolidation, consolidation test, determination of coefficient of consolidation, degree of consolidation, relevance of one dimensional consolidation to field condition, time factor

Unit 6: EARTH PRESSURE (08)

Earth pressure theory:- Concepts, area of application, Earth pressure at rest, active and passive conditions. Rankine's and Coulomb's theory of earth pressure, Graphical solution- Trial wedge method, Culman's method – Rehbhan's construction and modification. Critical depth of open cut in cohesive soil.

CV 312 - GEOTECHNICAL ENGINEERING-I (Laboratory)

INTERNAL CONTINUOUS ASSESSMENT (ICA)

ICA shall consist of at least eight of following experiments in the laboratory:

1. Specific gravity determination of coarse and fine gained soil
2. Particle size distribution- Mechanical sieve analysis, wet sieve analysis
3. Determination of Atterberg's consistency limits
4. Permeability- Determination of coefficient of permeability
5. Field density determination: Sand replacement & Core cutter method.
6. Proctor compaction test : Light & Heavy
7. Direct box shear test
8. Unconfined compression test
9. Tri-axial test
10. Laboratory Vane Shear Test.
11 One dimensional consolidation test

TEXT BOOKS

1. Soil Mechanics and foundation Engineering- B.C. Punmia [Laxmi publications (Pvt) Ltd, New Delhi]
2. Geotechnical Engineering- Purushottam Raj [Tata Mcgraw hill company Ltd, New Delhi]
3. Basic and applied Soil Mechanics (Revised Edition) – Gopal Rajan and Rao A.S.R. (New Age, New Delhi. 1998)
4. Soil Mechanics and Foundation Engineering - Dr. K. R. Arora, [Standard Publication]
5. Soil Mechanics and Foundation Engineering -V.N.S. Murthy [UBS publishers and distributors, New Delhi]
6. Geotechnical Engineering- Kasamalkar B. J. [Pune Vidyarthi Griha Prakashan, Pune]
7. Geotechnical Engineering - C. Venkatachalam [New Age International (I) Ltd, New Delhi]

8. Principals of Geotechnical Engineering- Braja M. Das (Cengage Learning India Pvt. Ltd, New Delhi)
9. SP36-1 Compendium of Indian Standards on Soil Engineering Part 1
10. SP36-2 Compendium of Indian Standards on Soil Engineering Part 2

REFERENCE BOOKS

1. Soil Mechanics in Engineering Practice - Terzaghi and Peck, John Wiley and sons, New York
2. Fundamentals of Soil mechanics - Taylor D.W, [John Wiley, New York]
3. Soil mechanics in theory and practice- Alam Singh [Asian Publishing House, Bombay]
4. Soil Testing -T.W. Lambe [Willey Eastern Limited, New Delhi]
5. Geotechnical Engineering by Shashi K. Gulati & Manoj Datta, Tata McGraw Hill

T.E. (CIVIL ENGINEERING) PART- I

CV- 313 ENVIRONMENTAL ENGINEERING –I

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE (Theory)	70 Marks

Course Objectives

1. To acquaint the students with drinking water quality standards and forecast water demands.
2. To study the various units of water treatment plants, treatment procedures and sequencing of water treatment units for various sources of water.
3. To enable the students to carry out design of water distribution systems and appurtenances using appropriate methods.
4. To acquaint the students with various water supply systems, and their operation and maintenance.

Course Outcomes

Upon successful completion of course the student will be able to:

1. Plan and design water conveyance systems for a rural/urban area based on population forecasts.
2. Design various water treatment units and plan their operations on the basis of raw water quality and water demand.
3. Apply knowledge of advanced water treatment processes for individual water purification units.
4. Plan and design water distribution systems
5. Analyze operation and maintenance problems in water supply systems.

SECTION I

Unit 1: Quantity and Quality of Water **(06)**

Sources of water, Quality & Quantity of water sources, Intake work, Demand of water, factors affecting demand, Fluctuation in water demand and its effect, Design period, Population forecast. Calculations for fire demand, Water quality parameters, characteristics and their significance, Drinking water quality standards.

Unit 2: **(08)**

a. **Water Treatment:** Principles of water treatment operations and processes, water treatment flow sheets.
b. **Aeration:** principle and concepts, necessity, methods, Removal of test and odor
c. **Sedimentation:** plain and chemical assisted- principle, efficiency of an idle settling basin, settling velocity, types of sedimentation tanks, design of sedimentation tanks, introduction and design of tube settlers.
d. **Coagulation and flocculation:** Principle of coagulation, common coagulants, alum and ferric salts, introduction to other coagulants aids like bentonite clay, lime stone silicates and Polyelectrolytes, introduction to natural coagulants, design of Flocculation chamber, Design of Clari-flocculator.

Unit 3: **(09)**

a. **Filtration:** Theory of filtration, mechanism of filtration, filter materials, Types: Rapid, Gravity, Pressure filter, Multimedia and Dual media filters, components, Under drainage system, Working and cleaning of filter, Operational troubles, Design of rapid and gravity filters.
b. **Disinfection**: Mechanisms, factors affecting disinfection, Types of disinfections, Types and methods of chlorination, Break point chlorination, Bleaching powder chlorination.
c. **Demineralization methods**: Lime- soda, Ion-Exchange, Reverse Osmosis, Ultra filtration and Electro dialysis.
d. **Fluoridation and Defluoridation**

SECTION II

Unit 4: Conveyance of Water **(08)**

Transmission of water, pumping and gravity mains, choice of pipe materials, stresses in pipes, economic size of conveying main, thrust block design.

Distribution reservoir, service storage, necessity, location, and Design (head and capacity) requirements.

Unit 5: Distribution of Water **(09)**

Water distribution systems, method of distributing water, system configuration, appurtenances, basic system requirements, hydraulic analysis head balance method, quantity balance method, equivalent pipe concept,

Unit 6: Maintenance of water supply System **(05)**

Operation & Maintenance of conveyance system, Types of Corrosion and control measures.

Maintenance of water distribution systems, leak detection, variations in Water quality and pressure distribution systems. Water pollution and control act -Terminology and significance

CV 313 - ENVIRONMENTAL ENGINEERING –I (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA includes practical work to find the characteristics of water and assignments on each unit operations

(A) Experiments for the determination of the following (Min. 10)

1. p^H value
2. Alkalinity
3. Acidity
4. Chloride content
5. Hardness

6 .Turbidity

7. Residual Chlorine

8. Total Dissolved Solids through measurement of conductivity

9. Solids – Total, Suspended, dissolved, volatile and fixed

10. Dissolved Oxygen

11. Most Probable Number

12. Optimum dose of alum by jar test

13. Fluorides

14. Nitrogen

15. Irons and Manganese

(B) Design /Analysis Problems on each water treatment unit / distribution system

(C)Visit to water treatment plant

Internal Continuous Assessment (ICA) submission shall consist of journals containing

1. Above mentioned Experiments
2. Visit report describing the water treatment units of the plants visited.
3. Design of distribution system by using software or programming.

TEXT BOOKS

1. Environmental Engineering by Peavey, H. S. Rowe, D.R. and Tchobanoglous McGraw Hill Book Company.
2. Water Supply and Pollution Control by Viessman W. and Hammer M.J. Harper Collins College Publishers.
3. Water and Waste Water Technology by Hammer M.J. Prentice-Hall of India Private ltd.
4. Water and Wastewater Technology by G.S. Birdie and J.S. Birdie
5. Water Supply by Duggal K.N., S. Chand and Company.
6. Water Supply by Garg S.K., Khanna Publishers.
7. Water Supply and Waste water Disposal by Fair and Gayes, John Wiley Publication.
8. Water Supply Engineering by B.C. Punmia, Ashok Jain, Arun Jain, Laxmi Publications

REFERENCE BOOKS

1. Manual on Water Supply and Treatment- Government of India Publication.-1993
2. “Water and Waste Water Engineering Vol. I & II”, John Wiley Publication, 1966. Fair G.M, Geyer J. C, and Okun D. A
3. “Water and Waste Water Technology”, Prentice Hall of India Private Limited, 1996. Hammer M. J.

T.E. Civil – Part I

CV- 314 WATER RESOURCES ENGINEERING – II

Teaching Scheme:		Examination Scheme:	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE (Lab) :	25 Marks
		ESE(Theory):	70 Marks

Course Objectives:

1) To study the different aspects of design of hydraulic structures
2) To design different types of dams
3) To provide knowledge on various hydraulic structures such as energy dissipaters, head and Cross regulators, canal falls and structures involved in cross drainage works
4) To understand the analysis of seepage and hydraulic jump

Course Outcomes:

After studying this subject the students will be able to

1) Plan and design the reservoirs depending upon the water resources potential.
2) Analyze and design Gravity dams and Earth dams (Simple Designs).
3) Demonstrate the design principles of Arch dams.
4) Solve seepage problems for Weirs on Permeable Foundations
5) Demonstrate the knowledge of water power engineering and river training.

SECTION – I

Unit 1: **(5)**

a) Planning of Reservoirs: Storage calculations, Control levels, silting of reservoirs, reservoir sedimentation surveys, reservoir losses. Use of remote sensing for reservoir sedimentation surveys.

b) Dams – Necessity, types of dams, selection of site for dams, selection of type of dam, Introduction to dam instrumentation

Unit 2: **(8)**

a) Gravity Dams - Forces acting on dam, design criteria, theoretical and practical profile, high and low dam, stability calculations, materials and methods of Construction, Galleries, joints, Dam Instrumentation, Computer Application for Design of Dam.

b) Arch Dams – Types, Layout of Constant angle and Constant radius arch dam, Forces acting on arch dams.

Unit 3: **(5)**

Earth Dams: Components and their functions, Design Criterions; Seepage through and below earth dam, Application of Slip circle method, Inverted Filters, Downstream Drainage, relief wells, Construction of earth dam.

Unit 4: **(5)**

a) Spillways: Necessity and different types , factors affecting choice and type of spillway, elementary hydraulic design, jump height and tail water rating curve, energy dissipation below spillway, gates for spillway. Spillway operations for different discharge values.

b) Outlets through Dams: types and energy dissipation in outlets transition

SECTION – II

Unit 5: **(6)**

a) Weirs on Permeable Foundations: Theories of seepage, Bligh's creep theory, Khosla's theory - exit gradient, Piping and undercutting, Concept of flow net etc. Kolhapur type weirs- working principles, suitability and construction.

Unit 6: **(6)**

a) Canals: Types, Alignment, Design – Kennedy's and Lacey's Silt theories, Canal losses, Typical canal sections, canal lining – Necessity and types, Economics of canal lining.

b) Canal Structures (Introduction): Cross drainage works and canal regulatory works - Aqueduct, Culvert, Super passage, Level Crossing, Cross and Head regulator, Canal Siphon, Canal Escape, canal fall, canal outlets.

Unit 7: **(5)**

a) River and River Training Works: Types of rivers, Meandering phenomenon, Types of river training works, river navigation.

b) Water Logging and Drainage: Causes, effects, preventive and curative measures, alkaline soils, soil efflorescence, drainage arrangements.

Unit 8: **(5)**

Elements of Hydropower Engineering: Power crisis and competing uses of water, need of harnessing solar energy. Types of water power plants, small hydropower plants, layout and components of each type, Intakes, Conveyance system, Surge tanks, Power house types, components and layout, tail race. Managing power demand using various sources of power.

CV314 - WATER RESOURCES ENGINEERING – II (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

A) Minimum seven assignments from the following:

1) Determination of height of dam: Reservoir capacity calculations based on demand and Supply, fixing control levels of dam for completed project or ongoing project.
2) Design of gravity dam: Elementary and practical profile with stability calculations
3) Earth dam
   a) Design- Determination of section – slip circle calculations.
   b) Filters and Drainage arrangements.
4) Spillway: Geometrical section, Design of spillway; Energy dissipation arrangements and gates.
5) Arch dam layout of constant angle and constant radius
6) Drawing sheet: Outlets through earth dam. Masonry dam, layout.
7) Drawing sheet: Typical plan and section of Kolhapur type barrage.
8) A typical layout of Hydropower plant and its functioning. Calculating reservoir capacity for hydropower plant
9) Design of any one Canal Structure / Cross Drainage Works

B) Report based on Field visits to Irrigation and Water Power Engineering Projects

END SEMESTER EXAMINATION

ORAL EXAMINATION

Oral Examination will be based on the ICA.

TEXT BOOKS:

1. Irrigation Engineering – S. K. Garg , Khanna Pub. Delhi
2. Irrigation and Water Power Engineering - Priyani , Charoter pub. House, Anand
3. Irrigation and Water Power Engineering – Punmia, B. C.
4. Irrigation – Bharat Singh, NEW CHAND & bros. Roorkee
5. Irrigation Engineering Vol. I – Varshhey and Gupta
6. Engineering Hydrology - K. Subramanya
7. Design of Canals – Circular of Government of Maharashtra, 18 February 1995

REFERENCE BOOKS:

1. Design of Small Dam – U. S. B. R., OXFORD & IBH pub.co.
2. Engineering for Dam Vol. I, II, III – Justinn, Creager and Hinds
3. Design of Hydraulic Structures Vol. I & II – Leliavsky
4. River Behaviour, Management and Training - CBIP Publication

T.E. (CIVIL ENGINEERING) PART-I

CV- 315 TRANSPORTATION ENGINEERING - I

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE (Theory):	70 Marks

Course Objectives:

1. Study of the various principles of highway planning, design of flexible and rigid pavements, traffic engineering and traffic safety analysis.
2. Familiarising the students with desirable properties and testing procedures of highway construction materials as per IS and Indian Roads Congress (IRC) standards.
3. To learn types of pavements, components and functions of pavements, types of highway vehicles, IRC loadings, equivalent axle loading and load factors, Flexible and Rigid pavement design methods, etc.
4. To carry out Economic analysis of Highway projects by various methods
5. To study about tunneling methods in various types of soils.

Course Outcomes:

After completion of the course, students will be able to

1. Carry out geometric design and pavement design of roads for particular nature and intensity of traffic as per IRC standards.
2. Carry out testing various road construction materials in Laboratory using modern equipments& instruments and draw appropriate conclusions regarding their usability.
3. Undertake traffic studies and know the applications of Intelligent Transportation System (ITS) in traffic management.
4. Perform the economic analysis of highway projects.
5. Select appropriate shape of tunnel and adopt proper tunneling method of tunnel construction.

SECTION- I

Unit: 1 **(7)**

Introduction to Transportation engineering: Modes of transportations, their importance and limitations, the importance of highway transportation.

Highway Development and Planning: Principles of Highway planning, Road development in India, Classification of roads, road network patterns, Planning Surveys.

Highway Alignment: Requirements, Engineering Surveys.

Unit: 2 **(7)**

Highway Geometric Design: Cross Section elements, carriageways, camber, stopping and overtaking sight distances, Sight distance at uncontrolled intersection Horizontal alignment-Curves, design of super elevation, extra widening, transition curves, vertical curves.

Unit: 3 **(6)**

Traffic Engineering: Fundamentals of traffic flow, Road User and Vehicular characteristics.

Traffic Studies: Volume studies, speed studies, parking studies, origin-destination studies, accident studies and applications of Intelligent Transportation System (ITS) in traffic management.

Unit: 4 **(4)**

Highway Materials: Properties of sub grade and pavement component materials, Tests on subgrade soils (CBR and Plate load tests), aggregates and bituminous materials, bituminous mix design. Applications of Geosynthetics in road construction.

SECTION- II

Unit: 5 **(8)**

Pavement Design**:** Types of pavements, Design parameters, Axle and Wheel load, tyre pressure, ESWL concept, IRC method of flexible pavement design based on CSA method using IRC-37-2012. Analysis of wheel load and temperature stresses of rigid pavement, joints, Design of Rigid Pavement as per IRC-58-2015.

Unit: 6 **(5)**

Highway drainage: Surface and sub-surface drainage.

Highway Construction and Maintenance: Specifications, construction steps and quality control tests for Granular sub base course, Water Bound Macadam, Wet Mix macadam, bituminous concrete pavement, Cement Concrete pavement. Pavement failures, causes, Pavement evaluation, Functional and Structural evaluation.

Unit: 7 **(4)**

Highway Economics and Financing: Highway user benefits – VOC using charts only – Highway costs – Economic analysis by annual cost method and benefit cost ratio methods. Highway financing – BOT, DBFOT and BOOT concepts.

Unit: 8

Tunnel Engineering: **(4)**

Introduction to tunneling, size and shape of tunnel and suitability, tunneling through soils, soft and hard rocks, tunnel lining, drainage and ventilation.

CV- 315 TRANSPORTATION ENGINEERING – I (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

1. CBR test on soil
2. Impact test on aggregate
3. Crushing strength test on aggregate

4. Abrasion Test on aggregate
5. Soundness test on aggregate
6. Shape test on aggregate
7. Specific gravity test on bitumen
8. Penetration test on bitumen
9. Flash and Fire point test on bitumen
10. Ductility test on bitumen
11. Softening Point test on bitumen
12. Viscosity test on Tar
13. Marshall Stability Test on bitumen mix

From the above tests, Minimum 8 Tests have to be performed.

Assignments based on syllabus.

TEXT BOOKS

1. Highway Engineering By C.E.G.Justo, A. Veeraragavan& S.K.Khanna., *Nemchand Bros.*
2. Traffic and Transport Planning By L.R.Kadiyali, *Khanna publisher, New Delhi*.
3. Highway Engineering By By L.R.Kadiyali., Khanna Publishers, New Delhi.
4. Harbour, Dock and Tunnel engineering By R. Shrinivasan, *Charotar Publishing House.*
5. Transportation Engineering By Subramanian. K.P Scitech Publications, Chennai.
6. Principles of Transportation and Highway Engineering By Rao, G.V., McGraw – Hill Publishing Company Limited, New Delhi.

REFERENCE BOOKS

1. Principles of Transportation Engineering, By Chakroborty and Das, *PHI Publication*.
2. Transportation Engineering – An Introduction, by Khistry, C.J., PHI Publication.
3. Specifications of Road and Bridge Works (MoRTH) Publication –5th Revision. New Delhi.
4. IRC: 37-2012, IRC: 58-2015 and other relevant IRC codes

Solapur University Solapur

SLH- 31 Self Learning- H.S.S. courses

Third Year Civil Engineering – I (Semester-V)

A. Student shall select a 'Self Learning Course' from Solapur University, Solapur 'HSS Course List' and appear for its examination as and when conducted by Solapur University, Solapur. Minimum four assignments for Self Learning Modules at T. E. Part I shall be submitted by the students which shall be evaluated by a 'Module Coordinator' assigned by institute / department.

List of Solapur University Self Learning- H.S.S. courses

1. Economics
2. Intellectual Property Rights for Technology Development and Management
3. Introduction to Sociology
4. Stress and Coping
5. Professional Ethics & Human Values

OR

B. Student with prior approval of the institute shall select and enroll for 'National Programme on Technology Enhanced Learning (NPTEL)' course from HSS domain with minimum eight weeks duration, complete necessary assignments and appear for certificate examination as per the NPTEL schedule during respective semester.

For more details about Self Learning Course (HSS) please refer to separate rule document available from Solapur University, Solapur.

More details about NPTEL are available at http://nptel.ac.in

T.E. (CIVIL ENGINEERING) PART- I

SLH- 31 ECONOMICS

(Self Learning- H.S.S. course, common for all the branches of Engineering and Technology)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

SECTION I

Unit 1: Introduction

History of Economic thought, Basic Economic problems, Resource Constraints and Welfare maximization,

Nature of Economics: Positive and Normative Economics, Micro and Macro Economics, Basic concepts in Economics, The role of State in economic activity, Market and Government failures, New economic Policy in India.

Unit 2: Theories of Economics

Theory of utility and consumer's choice, Theories of Demand, supply and market equilibrium, Theories of firm, production and costs, Market structures, Perfect and imperfect competitions, oligopoly, monopoly.

Unit 3: Macroeconomics

An overview of Macroeconomics, measurement and determination of national income, Consumption, saving and investment.

Unit 4: Banking & Inflation.

Commercial and Central Banking, Relationship between money, output and prices. Inflation causes, consequences and remedies.

Unit 5: International Influences on Economics

International Trade, foreign exchange and balance payments, stabilization policies, Monetary, Fiscal and exchange rate policies.

ASSIGNMENTS

The Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus.

(One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the assignments.

TEXT BOOKS

1. Economics: P.A. Samuelson & W.D Nordhaus (McGraw Hill, New York, 1995.)
2. Modern Microeconomics : A. Koutsoyiannis (Macmillan,1975)

REFERENCE BOOKS

1. Microeconomics: R Pindyck and D.L. Rubinfield. (Macmillan New York, 1989
2. Microeconomics: Gordon, 4th edition, Little Brown & Co., Boston,1987.
3. The Organization of Industry: William F. Shughart II, Richard D. Irwin, Illinois, 1990.

T.E. (CIVIL ENGINEERING) PART- I

SLH- 31 INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT

(Self Learning- H.S.S. course, common for all the branches of Engineering and Technology)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

Unit 1.

Dynamics of Knowledge evolution, creation of ownership domains in the knowledge space using various instruments of IPR,

Unit 2.

Outlines concepts of confidentiality and information security, explores their role in technology development and transfer integrating Intellectual Property in project planning, execution & commercialization,

Unit 3.

Discussion on the shifting paradigms of R&D and their linkage to IPR, Introduction to concepts of Valuation of IP & Value Realization,

Unit 4.

Comparison the Indian IPR system with international IPR frameworks especially in the context of WTO, followed by a few sessions on IPR litigations both for the enforcement of rights and business strategy.

Unit 5.

Discussion on contentious issues of current interest such as Biotechnology and Intellectual Property, Protection of Traditional Knowledge, IPR and Electronic Commerce, TRIPS and Access to Medicines, Copyright issues in creative works, etc.

ASSIGNMENTS

The Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus.

(One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the assignments.

TEXT BOOKS

1. Prabuddha Ganguli: Intellectual Property Rights Unleashing the Knowledge Economy. Tata McGraw Hill, New Delhi, 2001.
2. Prabuddha Ganguli: Gearing Up for Patents The Indian Scenario. Universities Press India Ltd., Hyderabad, 1998.
3. P. Narayan: Patent Law. Eastern Law Co., Calcutta.

REFERENCE BOOKS

1. Global Dimensions of Intellectual Property Rights in Science and Technology, Author: National Research Council , National Academies Press, 1993.
2. Technology Transfer: Intellectual Property Rights, C Sri Krishna, ICFAI University press (2008)

T.E. (CIVIL ENGINEERING) PART- I

SLH- 31 INTRODUCTION TO SOCIOLOGY

(Self Learning- H.S.S. course, common for all the branches of Engineering and Technology)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

Unit 1.

What is sociology, some sociological concepts: social structure, status, role, norms, values etc., Socialization, and culture and change.

Social stratification - various approaches and concept of social mobility.

Unit 2.

Population and society - Trends of demographic change in India and the world, Human Ecology, Trends of Urbanization in the developing countries and the world.

Unit 3.

Major social institutions - Family and marriage, caste and tribe and organizations:

i. Formal organization (bureaucracy)

ii. Informal organization.

Unit 4.

Processes of social change- Modernization (including Sanskritization), industrialization, environmental/ecological changes and development.

Unit 5.

Social movements - protest movements, reformist movement and radical movements in India.

ASSIGNMENTS

The Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus.

(One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the assignments.

TEXT BOOKS

1. Sociology, L. Broom, P. Selznick and D. Dorrock, 11th Edn. 1990 (Harper International).
2. Sociology: Themes and Perspectives, M. Haralambos, Oxford University Press, 1980.
3. General Introduction to Sociology, Guy Rocher, A. , MacMillan, 1982.

REFERENCE BOOKS

1. Social movements in India, vols. 1-2, 1984, M.S.A. Rao, Manohar Publications.
2. Society in India, David Mandelbaum, 1990, Popular Publications.
3. Social change in modern India, M.N. Srinivas, 1991, Orient Longman Publications.

T.E. (CIVIL ENGINEERING) PART- I

SLH- 31 STRESS AND COPING

(Self Learning- H.S.S. course, common for all the branches of Engineering and Technology)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

Unit 1.

Concept of stress-current and historical status. The nature of the stress response.

Unit 2.

Common sources of stress biological, personality and environmental.

Unit 3.

Coping styles defensive behaviors and problem-solving. Consequences of stress - medical, psychological and behavioral.

Unit 4.

The role of social support in mitigating stress.

Unit 5.

Stress management techniques-relaxation, meditation, cognitive restructuring, self-control, bio-feedback and time management.

The students will prepare their stress profile.

ASSIGNMENTS

The Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus.

(One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the assignments.

TEXT BOOKS

1. Walt, S. "Stress Management for Wellness". Harcourt Brace & Jovanovich, N.York, 1994.
2. D. Girdano and G. Everly., "Controlling Stress and Tension", Prentice-Hall, 1986.
3. Monat and R. Lazarus, "Stress and Coping: An Anthology", Columbia Univ. Press, 1985.

REFERENCE BOOKS

1. Weisman, "The Coping Capacity", Human Services Press, 1984.
2. Stress and Coping: The Indian Experience, D.M. Pestonjee, SAGE India; Second edition (1998)

T.E. (CIVIL ENGINEERING) PART- I

SLH- 31 PROFESSIONAL ETHICS & HUMAN VALUES

(Self Learning- H.S.S. course, common for all the branches of Engineering and Technology)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

Unit 1. Human Values

Morals, Values and Ethics - Integrity, - Work Ethics - Service Learning - Civic Virtue -Respect for others - Living Peacefully - Caring - sharing - Honesty - Courage - Valuing Time - Cooperation - Commitment - Empathy – Self-Confidence - Character - spirituality

Unit 2. Engineering Ethics

Senses of engineering ethics - Variety of Moral Issues - Types of inquiry - Moral Dilemmas Moral Autonomy - Kohlberg's Theory - Gilligan's Theory - Consensus and Controversy - Models of Professional Roles - Theories about Right Action - Self-Interest - Customs and Religion .

Unit 3. Safety, Responsibilities and Rights

Safety and Risk - Assessment of safety and Risk - Risk Benefit Analysis and Reducing Risk -The Three Mile Island. and Chernobyl Case Studies.

Collegiality and Loyalty - Respect for Authority - Collective Bargaining - Confidentiality - Conflicts of Interest - Occupational Crime - Whistle Blowing - Professional Rights – Employee Rights - Intellectual Property Rights (IPR) – Discrimination

Unit 4. Global Issues

Multinational Corporations - Environmental Ethics - Computer Ethics - Weapons Development - Engineers as Managers - Consulting Engineers - Engineers as Expert Witnesses and Advisors - Sample Code of Ethics of ASME, ASCE, IEEE, Institution of Engineers (India), etc.

ASSIGNMENTS

The Internal Continuous Assessment (ICA) will consist of total four assignments, based on syllabus (One assignment for every unit of the syllabus).

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the assignments.

TEXT BOOKS

1. Bayles, M.D.: Professional Ethics, California: Wadsworth Publishing Company, 1981.
2. Koehn, D.: The Ground of Professional Ethics, Routledge, 1995.
3. R.S. Naagarazan, A Text Book of Professional Ethics & Human Values, New Age International, 2006

REFERENCE BOOKS

1. Camenisch, P.F.: Grounding Professional Ethics in a Pluralistic Society, N.Y.: Haven Publications, 1983.
2. Wuest, D.E.: Professional Ethics and Social Responsibility, Rowman & Littlefield, 1994.

Solapur University, Solapur

T.E. (Civil Engineering) Semester-I

CV- 316 BUILDING PLANNING AND DESIGN USING CADD

Teaching Scheme:		**Examination Scheme:**	
Lectures:	1Hr/Week, 1 Credit	**ICA:**	50 Marks
Practical :	4 Hrs/Week, 2 Credits	**ESE (Drawing):**	25 Marks

Course Objectives:-

1. To impart knowledge of the principles and norms of public building.
2. To inculcate and apply CADD skill for public building drawing.
3. To prepare submission drawing of public building using CADD
4. To impart the knowledge of public building through site visit

Course Outcome:-

At the end of this course, students will be able to,

1. Plan and design a public building according to requirements adhering to appropriate norms and standards.
2. Prepare "Municipal drawing" for public buildings for obtaining building permission from competent authority.
3. Prepare the building drawings by using suitable 'Computer Aided Drawing and Design' application software.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

A. Preparation of drawings for any one public building by using AutoCAD

- Permission Drawing (Compulsory)

  Any two of following Three shall be drawn
- Furniture layout
- Water supply and Drainage layout along with electrification layout
- Perspective drawing of the above building.

B. Line plan of any two public buildings by using AUTOCAD

C. Report on building project under (A) above.

D. Site visit for the type of public building selected for planning and designing for Internal Continuous Assessment (ICA) submission.

END SEMESTER EXAMINATION (oral)

1. Practical examination shall be based on assessment of knowledge of students about planning skill and AutoCAD draft skill related to public building. (Maximum two hours shall be allotted to students to complete given task on AutoCAD during Practical and viva Exam.)
2. In addition Oral examination shall be based on Practical and Term Work.

TEXT BOOKS

1. Building Construction: Arora and Bindra, Dhanpat Rai Publications

2. Building Design and Drawing – Y.S.Sane, Allies Book Stall

3. Principles of Perspective drawing- Shah, Kale, Patki, Tata McGraw Hill Publication Ltd,Delhi

4. Building Construction by Sushil Kumar, Standard Publishers Distributors, Delhi

5. Interior Design- Principles and Practice- M. PratapRao, Standard Publishers and Dist.,Delhi

6. Building Planning and Design by Kumar Swami and Kameshwar Rao, Charotar Publishing House.

7. Civil Engg. Drawing- by M. Chakraborty, Published by M. Chakraborty – Kolkata

8. Civil Engineering Drawing – by R.S.Malik, G.S.Meo, Computech Publication Ltd New Asian.

9. AutoCad software

REFERENCE BOOKS:

1. Building Construction by Mckay, W. B. &Mckay, J. M. ,Vol.III and IV, Donhead Publishing Limited

2. Modern Building Construction by Warland D. E., Vol. I and II, Pitman Publishing

3. Building Drawing – Shah, Kale, Patki, Tata McGraw-Hill Education

4. Built Environment by Shah, Kale, Patki, Tata McGraw-Hill Education

5. Construction science – by Edwin Walker, Selwyn Morgan, Hutchinson Educational

6. Time savers standards for buildings – Calendar Pub. McGraw Hill

7. Alternative Building Materials & Technology-by Jagdish ,Reddy, Rao Published by New Age International, New Delhi

8. Nuclear Reactor Materials by C. Smith, Addison- Wesley Pub.

9. Art in everyday life by Goldstein, Oxford Pub.

10. Planning by E and OE – Pub. London Illiffe and Sons Ltd.

11. Inside Outside- Magazine issues.

12. Maintenance of Building- by A.C. Panchdhari, Published by New Age International, New Delhi.

13. Materials for Nuclear Power Reactors- by Hausner, Henry H. And Roboff, Stanley B., Reinhold Publishing Corp

14. Environment and services-by Peter Burberry, Mitchells Building Series

15. Development Control Rules- Building Byelaws of Local Authority.

T.E. (CIVIL ENGINEERING) PART II
CV- 321 STRUCTURAL MECHANICS III

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course Objectives

1. The study of 'Force' and 'displacement' methods of analysis of statically indeterminate structures.
2. To illustrate the various methods by which students can analyze the structures for likely deformations and deflections for various load combinations.
3. To familiarize the students with the matrix methods of structural analysis.
4. To provide hands on experience to the students on application software for structural analysis.

Course Outcomes

Upon successful completion of the course, the students will be able to:

1. Discretize simple structures, identify static and kinematic degrees of freedom
2. Solve the problems of analysis of beams, trusses and frames for joint displacements, and forces in members, by force method and displacement method.
3. Analyze the structures by energy methods using Castigliano's theorem
4. Select and use appropriate application software for structural analysis.

SECTION I
FORCE METHODS

UNIT 1: INTRODUCTION (04)

Concept of Indeterminate structures, Degree of Static and Kinematic indeterminacy, Degrees of freedom for various types of structures, Methods of analysis and comparison of force and displacement methods.

UNIT 2: METHOD OF CONSISTENT DEFORMATIONS (08)

Propped cantilevers, Fixed beams, Continuous beams (Degree of Static Indeterminacy DSI $\leq$2), Yielding of supports.

UNIT 3: ENERGY METHODS (10)

Strain Energy due to various forces, Castigliano's theorem and Unit Load method, Betti's Law, Maxwell's reciprocal theorem, Two hinged arches, Indeterminate beams & rigid jointed Frames(DSI $\leq$ 2).

UNIT 4: FLEXIBILITY METHOD (08)

Derivation of flexibility equation, flexibility coefficients, Development of flexibility matrix, Analysis of beams and portals (DSI $\leq$ 3).

SECTION II
DISPLACEMENT METHODS

UNIT 5: MOMENT DISTRIBUTION METHOD (08)

Concept of stiffness of a member, Relative stiffness, Distribution factors, concept of moment distribution, Application to beams, portal frames with and without sway, Symmetry and antisymmetry, Sinking of supports, Shortcut moment distribution method.

UNIT 6: STIFFNESS METHOD FOR BEAMS (08)

Concept of stiffness, linearly elastic structures, derivation of Stiffness equation, Stiffness Coefficients, Development of stiffness matrix, Analysis of beams (D.K.I. ≤ 3), Sinking of supports.

UNIT 7: STIFFNESS METHOD FOR FRAMES (07)

Analysis of Portal frame and Trusses (D.K.I. ≤ 3).

UNIT 8: I.L.D. FOR INDETERMINANT STRUCTURES (07)

I.L.D for Beams (Degree of Static Indeterminacy (DSI ≤2) by using Mullers Bresauls Principle.

CV 321- STRUCTURAL MECHANICS III (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

1. It shall consist of assignments based on above topics.
2. Results of few assignment problems to be verified by using application software.

TEXT BOOKS

1. Mechanics of Structures (Vol. II) -S.B. Junnarkar, Charator Book Publishing House.
2.Structural Analysis- Negi and Jangid, Tata McGraw-Hill Publishing Company Ltd., New Delhi
3. Analysis of Structures (Vol. II) - Vazirani and Ratwani, Khanna Pub., Delhi
4. Structural Analysis- Matrix Approach- Pandit & Gupta, Tata McGraw-Hill Publishing Company Ltd., New Delhi

REFERENCE BOOKS

1. Matrix Analysis of Structures- Gere and Weaver, CBS Publishers, New Delhi
2. Indeterminate Structural Analysis-C. K. Wang, Tata McGraw-Hill Publishing Company Ltd., New Delhi
3. Theory of Structures- Timoshenko & Young, Tata McGraw-Hill Publishing
4. Structural Analysis-Sixth Ed.,- R. C. Hibbeler-Dorling Kindersley (India) Pvt. Ltd., Pearson Education, New Delhi.

T.E.CIVIL ENGINEERING PART II

CV 322 GEOTECHNICAL ENGINEERING –II

Teaching Scheme:		**Examination Scheme:**	
Lectures:	4Hrs/Week, 4 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course Objectives

1. To familiarize the students with various methods of exploration using field and laboratory tests for soils and rocks to estimate bearing capacity founding strata.
2. To acquaint the student various theories of bearing capacity estimation of founding soil, and likely settlement beneath the foundation
3. To provide the design procedures for shallow and deep foundations with their advantages and limitations, depending upon loading and field conditions.
4. To provide knowledge and practice of various methods of slope stability analysis of natural and artificial slopes

Course Outcomes

By the end of this course, the student will be able to:

1. Perform various field tests such as plate load test, standard penetration test and to interpret the data of field tests for the evaluation of bearing capacity.
2. Perform geotechnical design of different types of foundations such as isolated footing, combined footing, raft foundation etc.
3. Select and apply suitable ground improvement techniques for given field and loading condition.
4. Apply the knowledge of various slope stability theories for the design of embankments.

SECTION –I

Unit 1: SOIL EXPLORATION (08)

Introduction: - General requirements for satisfactory performance of foundations.

Soil Exploration:- Necessity, Planning, Exploration methods, Different types of boring- Hand and continuous flight augers, Wash boring, Rotary drilling. Soil sampling- Disturbed and Undisturbed. Rock drilling and sampling. Core barrels, Core boxes, Core recovery, RQD

Unit 2: BEARING CAPACITY (14)

Bearing Capacity Analysis: Bearing capacity – Ultimate, safe and allowable. Modes of failure, Terzaghi's bearing capacity equation with derivation, I S code method of bearing capacity (IS 6403 -1981), Effect of water table, Eccentricity of load.

Field Test for Bearing Capacity Evaluation: - Plate load test, Standard Penetration test and Pressure meter test. Test procedures and limitations.

Foundation Settlement: - Immediate settlement – computations as per IS 8009 – 1976 (Part–I) approach and from plate load test observations. Consolidation settlement, Total settlement, Differential settlement, Tolerable settlement, Angular distortion

Unit 3: FOUNDATION CONSTRUCTION IN DIFFICULT SOIL (08)

Guide lines and care to be exercised in weak and compressible soil, Expansive soil, Collapsible soil, Corrosive soils

Ground Improvement Techniques:- Pre compression, Sand drains, Vibro-floatation, Grouting, Soil reinforcement

Geotextiles and its applications: - Geotextiles- Definition and Types, Functions of Geotextiles, Different applications in Civil Engineering (Roads, Railways, Embankments, Earth Retainment, Erosion control etc.)

SECTION –II

Unit 4: SHALLOW FOUNDATION (06)

Shallow foundations: - Design of Isolated, Combined, Strap footing (Rigid analysis), Raft foundations (Conventional method), Floating foundations (RCC design is not expected)

Unit 5: DEEP FOUNDATION (10)

a) **Pile foundation:** Classification, Single pile capacity for RCC cast in situ pile in Cohesive, Non cohesive and mixed soils by Static method, Dynamic formulae, Negative skin friction. Under reamed piles- equipment, construction and precautions. Load carrying capacity of pile group, Group action of piles- Spacing of piles in a group, group efficiency- empirical formulae.

b) **Caisson Foundations:** Box, Pneumatic, open (well) caissons, Shapes of well, components. Forces on caisson, grip length, well sinking, practical difficulties and remedial measures

Unit 6:- COFFERDAM (08)

Cofferdams: Various Types, Cell fill material, Stability of cellular cofferdam.

Sheet Piles: Classifications, Design of cantilever sheet pile in cohesion less (approximate method) and cohesive soils. Design of anchored sheet pile by free earth support method

Unit 7: SLOPE STABILITY (06)

Slope Stability:- Stability of finite slopes- slip circle method, Semi graphical and graphical methods- Swedish slip circle method, Method of slices, Friction circle method. Fellenius construction to locate critical slip center, Stability Number and it's use.

CV 322 - GEOTECHNICAL ENGINEERING –II (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

The Internal Continuous Assessment (ICA) work shall consist of Laboratory work, Field work and Assignments on above topics

A) Field tests:-

1. Standard Penetration Test
2. Plate Load test
3. Vane Shear test

B) Visit to foundation construction sites and preparation of report.

C) Laboratory work:-

1. Swelling pressure test

D) Assignments consisting design problems on:-

1. Bearing capacity calculation by various methods
2. Settlement calculations
3. Design of shallow foundation - Isolated, Combined, Raft using conventional method.
4. Pile and Pile group - Load carrying capacity of piles, Design of pile group
5. Sheet piles - Cantilever, Anchored using Free earth support method
6. Stability analysis – Slip circle, slice method, Fellenius construction, Taylor's Stability Number.

TEXT BOOKS

1. Soil Mechanics and foundation Engineering -B.C. Punmia (Laxmi publications Pvt. Ltd, New Delhi)
2. Geotechnical Engineering- Purushottam Raj (Tata McGraw hill company Ltd, New Delhi)
3. Principals of Foundation Engineering – Braja M. Das (Cengage Learning India Pvt. Ltd, New Delhi)
4. Geotechnical Engineering - C. Venkatachalam (New Age International (I) Ltd, New Delhi)
5. Soil mechanics and foundation engineering- V.N.S. Murthy (UBS publisher's and distributers, New Delhi)
6. Foundation Design Manual- Dr. N.V. Nayak (Dhanpat Rai and Sons)
7. Foundation Engineering- Kasamalkar B.J. (Pune Vidyarthi Griha, Pune)
8. SP36-1 Compendium of Indian Standards on Soil Engineering Part 1
9. SP36-2 Compendium of Indian Standards on Soil Engineering Part 2
10. Design of sub structure- Swami Saran (Oxford and IBH Publications)

REFERENCE BOOKS

1. Foundation analysis and design- Bowles J. E. (Tata McGraw hill company Ltd New Delhi)
2. Foundation design and construction- Tomlinson (M.J. English Language Book Society, Essex)
3. Foundation Design- Teng W.C
4. Soil mechanics in theory and practice- Alam Singh, (Asian Publishing House, Bombay)

T.E. (CIVIL ENGINEERING) PART II
CV- 323 ENVIRONMENTAL ENGINEERING –II

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE (Lab):	25 Marks
		ESE(Theory):	70 Marks

Course Objectives

1. To acquaint the students with the characterization of municipal waste, as well as sewage collection & conveyance systems.
2. Study of Primary and Secondary treatment methods of sewage, and concept of recycling the wastewater.
3. Familiarize the students with stream pollution due to waste disposal and suitable centralized/decentralized wastewater Treatment system
4. Learning solid waste and hazardous waste management systems for urban areas.
5. Understanding various sources of air pollution, its measurement and control.

Course Outcomes

Upon successful completion of course the student will be able to:

1. Plan the layout of sewage collection system, matching the topography of the region and characterization of sewage.
2. Decide sequence and design of wastewater treatment units to meet the sewage treatment standards.
3. Design the wastewater treatment plant using Trickling filter, anaerobic treatment and low cost treatment methods
4. Adopt appropriate methods of Solid waste Disposal and Management of hazardous waste.
5. Measure air pollution and adopt control measures to control of industrial air pollution.

SECTION-I

Unit -1: Collection and conveyance of Sewage (08)

Components of wastewater flows, waste water sources and flow rate. Variation in flow rates, waste water constituents, Characteristics of municipal waste water, Quantity of storm water, Ground water infiltration.

Sewerage system, layout, types of sewers, collection system. Appurtenances Design of sanitary and storm water sewers, Maintenance of sewerage systems.

Sewage and sludge pumping, location, capacity and types of pumps, pumping station design.

Unit-2: Unit Operations (10)

Primary treatment- Screening, comminuting, grit removal, oil and grease trap, chemical precipitation.

Secondary treatment- Activated sludge process, Process design and operating parameters, modification of ASP, operational problems . SBR and MBR. Trickling filter, classification, process design considerations . Secondary Clarifications.

Unit -3: Anaerobic treatment and Low cost treatment (06)

Fundamentals of anaerobic treatment, sludge characteristics, Treatment and disposal, Concept of different anaerobic reactors.

Low cost waste water treatment methods- Principle of waste stabilization pond.

Design and operation of oxidation pond, aerobic and anaerobic lagoons, Aerated lagoon,

Oxidation ditch, septic tank.

Selection of alternative treatment process flow sheets. Concept of recycling of wastewater

(Gray water and brown water.)

SECTION-II

Unit-4: Disposal of waste water **(08)**

a) Disposal of waste water stream pollution, Self purification, DO sag curve, Streeter Phelp's Equation.

b) Emerging Technology for wastewater Treatment- Centralized Sewage Treatment System, objectives of small & decentralized wastewater Treatment system

i. Root zone Technology, ii. Constructed Wetlands, iii. Duckweed Ponds,

iv. Fluidized aerobic bed Technology, v. UASB

Unit -5: Solid Waste Disposal **(06)**

Solid waste management - Solid waste definition, Types, sources, characteristics.

Functional outlines- storage, collection, processing techniques,

Treatments of solid waste-Composting, Incineration, Pyrolysis and sanitary land filling.

Unit -6: Air Pollution **(07)**

Air Pollution- Definition, Sources and classification of pollutants, Effects. Introduction to meteorological aspects of control of industrial air pollution- Settling Chamber, Bag filter, Cyclone separator, Scrubbers, Electrostatic precipitators. Control of vehicular air pollution. Air quality standards

CV- 323 ENVIRONMENTAL ENGINEERING –II (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

The Internal Continuous Assessment (ICA) work includes practical work to find the characteristics of wastewater and demonstration of Air monitoring equipments and design of sewage treatment plant

Internal Continuous Assessment (ICA) work shall consist of the following:-

(A) List of Experiments (Any Eight)

Analysis of Waste Water

1. pH Value.

2. Total Solids
3. Biochemical Oxygen Demand
4. Chemical Oxygen Demand
5. Chlorides
6. Oil & Grease
7. Sulphate Content
8. Total Nitrogen
9. Demonstration of High Volume Sampler
10. Demonstration of Auto Exhaust Analyzer.

(B) Design of sewerage system & Treatment system for a small urban area.

(C) Visit to sewage treatment plant

Internal Continuous Assessment (ICA) submission shall consist of the following –

1. Journal containing experiments carried out in part A of the Internal Continuous Assessment (ICA) and visit Report on C
2. Detail design and appropriate drawings required for part B of the Internal Continuous Assessment (ICA) work.

END SEMESTER EXAMINATION (oral)

Oral examination will be based on the above syllabus.

TEXT BOOKS

1. Environmental Engineering by Peavey- H. S. Rowe, D.R. and Thobanoglous, [McGraw – Hill Book Company]
2. Water supply and pollution control - Viessman W. and Hammer M.J. [Harper Collins College Publishers.]
3. Waste Water Engineering Treatment & Disposal - Metcalf & Eddy, [Tata McGraw Hill, 1982]
4. Sewage Disposal and Air Pollution Engineering - Garg S.K., [Khanna Publishers]
5. Sewage Disposal and Air Pollution Engineering - Garg S.K., [Khanna Publishers]
6. Waste water Supply Engineering by B. C. Punmia

7. Solid Waste Management in Developing countries - Bhide A.D. and Sundersen B.B. [Indian National Scientific Documentation Centre, New Delhi]
8. Air Pollution- Rao M.N. and Rao H.V.N. [Tata McGraw Hill, 1990]

REFERENCE BOOKS

1. Manual on sewerage & sewage Treatment published by Ministry of Urban Development Govt. of India Msy-2000. 35 PDOP-4-59-85-97, Ministry of Urban development
2. Water and waste water Technology - Hammer M.J, [Prentice-Hall of India Private ltd.]
3. Masters. G.M. Introduction to Environmental Engineering and Science
4. Manual on Municipal Solid Waste Management- Ministry of Urban Development Govt. of India.

T.E. (CIVIL ENGINEERING) PART- I

CV- 324 ENGINEERING MANAGEMENT – I

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
		ISE:	30 Marks
		ESE(Theory):	70 Marks

Course Objectives

1. To explain the principles of management and their application to the functioning of an Organization.
2. To provide with the expertise and confidence to assume leadership positions in technical environments by successfully managing and working in teams and demonstrating problem solving abilities and rational, effective decision making.
3. To demonstrate basic concepts, Definitions and Terminologies used in Enterprise Resource Planning (ERP).
4. To practice applications of principles of Inventory management.
5. To recognize and apply quality assurance and quality control techniques for Construction Management
6. To explain use of tools of financial management for construction projects.

Course Outcomes

1. Lead a team, as well as work as a member of a team, for effective management of construction projects.
2. Apply the various Optimization techniques for decision making in construction industry.
3. Successfully manage the inventory of a project or industry.
4. Assess and assure about quality of materials and workmanship, in Civil Engineering projects.
5. Manage resources library and market rates, Perform rate analysis .Prepare a WBS (Work Breakdown structure) and Prepare an estimate etc. using the ERP system.

6. Calculate revenue to date for the project, evaluate the performance of a firm based on financial statements and manage working capital of a construction company.

SECTION – I

Unit (1) **(04)**

Definition and Functions of Management:-

Planning: Process of planning, Management by objectives.

Organizing: Formal and informal organization, centralization, decentralization, line, line and staff, functional organization. Leading, directing, controlling and coordination. Communication process, motivation.

Unit (2) **(09)**

Importance of Decision Making, steps in decision making.

Decision under certainty: Linear Programming, Formulation of simple L-P model, Graphical method, Simplex method, Duality.

Application of Linear Programming in 'Transportation Problems': North-West corner method, Least cost method, Vogel's Approximation method (Only Initial Basic Feasible Solution) and Application of Linear Programming in 'Assignment problems'.

Unit (3) **(04)**

Decision under uncertainty: Wald's, Savage, Hurvitz and Laplace criterion of optimism and regret, expected monitory value, Theory of games (dominance pure and mixed strategy).

Decision under risk: Decision tree.

Unit (4) **(04)**

Queuing or waiting line theory: Applications, Characteristics, Waiting Time and Idle Time costs, Single channel Queuing Problems for calculating average number of customers and average time in system and queue.

Monte Carlo Simulation: Concept, procedure and advantages.

Unit (5) **(02)**

Introduction to Dynamic Programming: Need and characteristics, stage and state, process of dynamic programming.

Introduction to emerging optimization techniques: Artificial Neural Networks, Fuzzy Logic, Genetic Algorithms (Only concept of each technique).

SECTION – II

Unit (6) **(04)**

Inventory control

Introduction, inventory cost, EOQ analysis, ABC analysis, safety stocks.

Unit (7) **(08)**

Construction ERP

Benefits, best practices: ISO Documents, Responsibilities, Document Directory Structures, Safety Measures, Approval system for Purchase, Work Orders and Billing, User permissions, The master libraries in the ERP system – Resources Master Library, Construction Activity Specifications Master Library, Rate Analysis Library

Estimation using an ERP system-WBS, BOQ, ABC, OH&CP

Unit (8) **(06)**

Financial management: Construction accounting, Chart of Accounts, Financial statements – Profit and loss, Balance sheets, Financial ratios, Working capital management

Linear break even analysis: Problems

Unit (9) **(04)**

Quality control: Concept, Statistical Methods, Control charts (X, R, p, c charts)

CV- 324 ENGINEERING MANAGEMENT – I (Laboratory)

INTERNAL CONTINIOUS ASSESSMENT (ICA)

Assessment shall be a continuous process based on the Assignments, class tests, quizzes, attendance and interaction during theory, and report presentation etc., as applicable.

1. Group Discussion on Civil Engineering Topics
2. Personal Interview and CV submission for career objective of every individual student
3. Assignments on Unit 2, 3, 4 and 5 consisting of solution of problems based on decision making.
4. A small one BHK house/industrial project estimating through an ERP
5. A field visit report covering Quality aspects in Civil Engineering
   The students will submit the record of Internal Continuous Assessment (ICA) work in Journal/workbook.

TEXT BOOKS

1 A. S. Deshpande, A Text book of Principles of Management and Personnel Management, Vora Publications, New Delhi, 1987.

2 Tripathi P. C., P N Reddy, Principles of Management, , Tata McGraw Hill International, New Delhi, 4th Ed. 2011.

3 Hamdy A. Taha, Operation Research, Prentice Hall of India, New Delhi, 8th Ed.2011

4 Menon K. S., Store Management, McMillan Co. New Delhi, 2nd Ed. 1998.

5 Dahlgaard J.J., Kai Kristesen, Gopal K. Kanji, Fundamentals of TQM- Eswar Press, First Indian Reprint 2004.

6 E. L. Grant, Statistical Quality Control- Wiley International Education, 6th Ed.

7 Peterson, S. J., "Construction Accounting and Financial Management", Pearson Education, Upper Saddle River, New Jersey, 2005.

REFERENCE BOOKS

1 Stoner J.A.F, Freeman R. E., Gilbert D. R., Management: Prentice Hall of India, New Delhi, 4th Ed 2008.

2 Koontz Z. H., Weihrich H, Essentials of Management: Tata McGraw Hill Publications , 2000.

3 Wagner H. M., Principles of Operation Research: Prentice Hall of India, 2nd Ed.1925.

4 Richard Bronson Govindsami N., Operation Research: Shaum's outline series, Tata McGraw Hill , 2nd Ed.2004

5 Gopal Krishnan, Sudeshan, Material Management:.

6 Juran J. M., A. B. Godfrey, Handbook of Quality Control- Mc Graw- Hill International, 5th Ed.

7 Udo Linden, Mrunalini Kulkarni, Hit-Office Construction ERP technical manual, Engineering Design Software and Services Pvt. Ltd., Pune, April 2018 Edition.

T. E. (CIVIL) PART – II

CV- 325 ELECTIVE – I

ADVANCED DESIGN OF STEEL STRUCTURES

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course Objectives:

1. To introduce the concept of plastic analysis
2. To study the behaviour and design of Multistoried Steel Buildings and Moment Resisting Frames
3. To study the design of Fixed and continuous beams by Plastic analysis
4. To learn analysis and design of Cold-formed light gauge steel sections
5. To study the behavior and design Concrete-steel composite sections

Course Outcomes:

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

1. Demonstrate the conceptual understanding of plastic analysis approach
2. Design trussed girder bridges and Cold-formed light gauge steel sections
3. Design multistoried steel buildings and moment resisting frames
4. Design fixed and continuous beams by Plastic analysis
5. Design Concrete-steel composite sections

SECTION – I

Unit 1: **(8)**

Design of Trussed girder bridges and bearings. Deck type, through type bridges, bracing systems, end bearings, mechanical and elastomeric bearings.

Unit 2: **(7)**

Multistory steel buildings, load transfer mechanism, lateral resisting systems, Design of moment resistant frames.

Unit 3: **(8)**

Cold-formed light gauge steel sections, special design considerations for compression elements, design of light gauge beams, behavior under repetitive loads and temperature effects.

SECTION – II

Unit 4: **(8)**

Plastic analysis, plastic bending of beams, plastic hinge, upper and lower bond theorems, uniqueness theorem, yield criteria, analysis and design of fixed and continuous beams.

Unit 5: **(7)**

Plastic analysis and design of portal frames, collapse mechanisms, multi story multi bay frames, plastic moment distribution method, minimum weight design, variable repetitive loads, introduction to limit states in steel Design.

Unit 6: **(7)**

Concrete-steel composite sections, elastic behavior of composite beams, Design of composite beams, Design of encased steel columns.

CV- 325 ELECTIVE – I

ADVANCED DESIGN OF STEEL STRUCTURES (Laboratory)

INTERNAL CONTINUOUS ASSESSMENT (ICA)

ICA shall include problems based on the topics mentioned in syllabus.

TEXT BOOKS:

1. Design of steel structures- A. S. Arya, J. L. Ajmani, Nemchand and brothers.
2. Structural analysis and design of tall buildings by B. S. Taranath, McGraw Hill.
3. Design of Steel Structures, N. Subramanian, Oxford higher education, 2008
4. Limit State Design in Structural Steel by M.R. Shiyekar
5. Design of steel structures- Vol. II by Ramachandran, Standard Book House, Delhi.

REFERENCE BOOKS:

1. Limit State Design of Steel Structures, S. K Duggal
2. Structural analysis and design of tall buildings by B. S. Taranath. McGraw Hill.
3. Steel skeletal Vol. II, Plastic behavior and design by J. F. Bekar, M. R. Horne, J. Heyman. ELBS.
4. Plastic methods of structural analysis by Neal B. G. Chapter and Hall.
5. Teaching Resource for structural steel Design – Vol.III by IIT Madras, Anna University Chennai, SERC, Madras and Institute for Steel Development and Growth (INSSDAG), Kolkata.

T. E. (CIVIL) PART – II

CV- 325 ELECTIVE – I

INDUSTRIAL WASTE TREATMENT

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course Objectives:

1. To understand sources of waste water in different industries.
2. To study waste water treatment options for different industries.
3. To acquire knowledge about disposal of effluents and the standards for disposal

Course Outcomes:

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

1. Characterize different industrial wastes
2. Suggest treatment alternative based on characteristics of industrial waste.
3. Demonstrate basic knowledge of legislation for pollution control

SECTION -I

Unit 1: **(5)**

Use of water in industry, Sources of wastewater, quality, and quantity variation in waste discharge, water budgeting, characterization and monitoring of wastewater flow, Grab samples and Composite samples. Population equivalent, Relative stability and Theoretical oxygen demand. Water quality criteria and effluent standards. Introduction to water quality index (WQI), methods used.

Unit 2: **(7)**

Waste volume and strength reduction, In-Plant measure, good housekeeping, Process change, leakage prevention, segregation, recycling, neutralization, equalization and proportioning of waste. In line equalization, Side line equalization. Methods for determining volume of equalization tank.

Unit 3: **(7)**

Water quality monitoring of streams, Self-purification of stream, Streeter Phelphs equation, Classification of streams. B.O.D. reaction rate - Method of least squares, Thomas method and Fujimoto method. D.O. Sag curve and D.O. deficit calculations.

Unit 4: **(4)**

Miscellaneous methods of dissolved solids removal- Ion-exchange, Electro dialysis, Reverse osmosis and Evaporation, Adsorption. Sludge disposal methods.

SECTION –II

Unit 5: **(4)**

Different types of waste treatment and their selections, Development of treatment flow diagram based on characteristics of waste. Pollution characteristics of common Industries.

Unit 6: **(9)**

Manufacturing processes in major industries, water requirements, wastewater sources, composition of wastes, Viz. Sugar, Distillery, Dairy, Pulps, Paper mill, Fertilizer, Tannery, Chemical, Steel Industry, power Plants, Textile Treatment flow sheets, alternative methods of treatment, factors affecting efficiency of treatment plant. Effect of above industrial wastes on receiving water bodies.

Unit 7: **(4)**

Introduction to the concept of zero discharge, Recycling and reuse and recovery Introduction to 3R principles to convert waste into wealth, Acclimatization of bacteria to toxic wastes, process sensitivity, operation and maintenance requirements.

Unit 8: **(5)**

Water pollution control act, organizational set up of central and state boards for water pollution control, classification of river on water use, minimal national standards, socioeconomic aspects of water pollution control.

Introduction to Wetland treatment – Root zone cleaning system. Introduction to green processes in the industries.

CV- 325 ELECTIVE – I

INDUSTRIAL WASTE TREATMENT (Laboratory)

INTERNAL CONTINUOUS ASSESSMENT (ICA)

1) Visit to any four of the following industries
   i. Sugar industry
   ii. Distillery industry
   iii. Dairy industry
   iv. Textile industry
   v. Tannery
   vi. Paper and Pulp
   vii. Common effluent treatment plant (CETP)

Note: - Detailed visit report shall be prepared for each of the industrial visit

2) One assignment on each unit.

TEXT BOOKS:

1. Industrial Waste Treatment - Nelson Nemerow, Addison - Wesley
2. Industrial Waste Treatment – Rao & Datta, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
3. Industrial Waste Water Treatment- Dr. A. D. Patwardhan, Prentice Hall of India

REFERENCE BOOKS:

1. Water and Waste Water Engg.- Fair G.M., Gayer J.C. and Okun D.A. , John Wiley Publication
2. Water and Waste Water Technology, M. J. Hammer and M. J. Hammer(Jr.)
3. Waste Water Engineering – Metcalf Eddy - Mc Graw Hill Publications.

T. E. (CIVIL) PART – II

CV- 325 ELECTIVE – I

WATER POWER ENGINEERING

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course Objectives:

1) To estimate the available hydropower potential
2) To understand types of hydro-power stations
3) To study the components and functions of hydro-power system
4) To learn the types of hydro-power system
5) To study the different types of loads on power plants

Course Outcomes:

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

1) Estimate the available hydropower in a project
2) Select suitable types of hydro-power system for particular site conditions
3) Design penstock and anchor blocks
4) Analyze the different types of loads on power plants
5) Design the components of Tidal power plant

SECTION – I

Unit 1: **(5)**

Introduction: Sources of energy, types of power station, choice of type of generation, component of water power project, types of hydro power schemes, general layouts of various hydropower schemes

Unit 2: **(4)**

Estimation of hydro power potential, basic water power equation, gross head, net head nature of supply, storage and pondage. Method of computing hydrographs, mass curves, flow duration curves.

Nature of demand: Load curve, load duration curves, load factor, plant factor, plant use factor, firm power secondary power

Unit 3: **(5)**

Intake structures - Types, level of intake, hydraulics of intake structures, trash rack, transition, conduit intake gates

Unit 4: **(3)**

Conduits: Types, economic section, power canals, pen-stock types, hydraulic design and economic diameter pipe supports, anchor blocks, tunnels – classification, location and hydraulic design, tunnel linings

Unit 5: **(5)**

Surge Tank: Functions and behaviour of the surge tanks, location, types of surge tanks, basic design criteria of simple surge tank, forebay

SECTION – II

Unit 6: **(4)**

Power station: General arrangements of a power station, power house, sub-structure and super structure, under ground power station – necessity principal, types, development and economics.

Unit 7: **(5)**

Turbines: Classification of turbines, characteristics of different types, choice of type of turbine, turbine setting and cavitations.

Unit 8: **(5)**

Tail race: Functions, types, channel and tunnel draft tubes, function and principal types

Unit 9: **(4)**

Pumped storage plants, purpose and general layout of pumped storage schemes, main types, typical arrangements of the upper reservoirs, economics of pumped storage plants

Unit 10: **(5)**

Tidal power stations: Classification according to the principle of operation and general description of different types, depression power plants

CV- 325 ELECTIVE – I
WATER POWER ENGINEERING (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

It shall consist of exercises based on theory.

Visit to Water Power Station. Visit report with the salient features and details of station.

TEXT BOOKS:

i) Hydro Power Structures – R. S. Varshney (ISBN 8185240787)

ii) Water Power Engineering – M. M. Dandekar, Vikas Pub. House Pvt. Ltd.

iii)Water Power Engineering – P. K. Bhattacharya, Khanna Pub., Delhi

iv)Water Power Engineering – M. M. Deshmukh, Dhanpat Rai and Sons

v)Textbook Of Water Power Engineering- Sharma R. K. , Sharma T. K Publisher: S Chand & Company Ltd.

REFERENCE BOOKS:-

i) Water Power Development – E. Mosonvi, Vol. I & II

ii) Hydro-electric Engineering Practice – G. Brown, Vol. I, II & III

iii) Hydro – Electric Hand Book – Creager and Justin

T. E. (CIVIL) PART – II

CV- 325 ELECTIVE – I

ADVANCED CONCRETE TECHNOLOGY

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course objectives:

1) To understand in detail the behaviour of fresh and hardened concrete.
2) To get acquainted with recent developments in admixtures in concrete
3) To understand factors affecting the strength, workability and durability of concrete
4) To learn about ready mix concrete, concrete mix design

Course Outcomes:

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

1) Select proper admixtures to obtain concrete of desired properties
2) Adopt appropriate type of special concrete for desired results
3) Design a concrete mix of required strength and workability properties
4) Adopt appropriate method for repairs and rehabilitation of concrete structures

SECTION – I

Unit 1: **(4)**

Review of cements including blended cement, chemical and physical process of hydration. Aggregates–Coarse aggregates, Natural sand, Crushed sand.

Unit 2: **(5)**

Addition to Concrete:- Review of types covering pulverized fuel ash, ground granulated blast furnaces slag and silica fume, Rice husk Ash, manufacture, physical characteristics, effects on properties of concretes. Admixtures: - Plasticizers, Super plasticizers, retarder, accelerators, Curing compounds and their effects on properties of concrete.

Unit 3: **(6)**

Properties of Fresh Concrete: Workability setting, bleeding and segregation. Theory and application principles governing in concrete placing and compaction of concrete Durability & impermeability, microstructure and carbonation of concrete, fire resistance

Unit 4: **(7)**

Special Concretes: - High performance concrete, High Strength concrete, fiber reinforced concrete, Light weight concrete, High density and radiation shielding concrete, High volume fly ash concrete, Self compacting concrete, Recycled concrete.

SECTION-II

Unit 5: **(5)**

Special Processes & technology for particular types of structures: Mass concrete, Sprayed concrete, Ferro-cement concrete, pumped concrete, Roller compacted concrete, Sustainability of concrete industry.

Unit 6: **(5)**

Ready mixed Concrete: Types of plants, Concrete specification, Process adopted for central RMC plant, Distribution & transport, Code recommendations, quality control.

Unit 7: **(4)**

Mix design: Review of methods & philosophies, mix design for special purpose (High grade concrete), variability of results.

Unit 8: **(3)**

Quality concepts: Definitions, principles & standards, quality control in concrete Construction, tools for quality management.

Unit 9: **(6)**

Repair & rehabilitation: Visual inspection of concrete structure, distress in concrete, Non-

destructive test, crack repair techniques, damage assessment procedure, deterioration- causes & prevention, strengthening techniques.

CV- 325 ELECTIVE – I

ADVANCED CONCRETE TECHNOLOGY (Laboratory)

INTERNAL CONTINUOUS ASSESSMENT (ICA)

It shall consist following experiments

1) Tests on fresh & hardened concrete: Workability tests, Strength test- compression, flexure

2) Mix design for high performance concrete: Experimental

3) Non destructive testing of concrete- Rebound hammer, Ultra sonic pulse velocity test

4) Effects of additives and admixtures in concrete: Effects on workability and strength of concrete.

TEXT BOOK

1) Concrete Technology, Theory and Practice by M.S. Shetty, S, Chand Publications, New Delhi

2) Concrete Technology- A.R. Santhakumar,-Oxford University

3) Concrete Mix Design- N. Krishna Raju - Sehgal Publishers

REFERENCE BOOKS:-

1) High performance concrete by P.C. Aitkin , Tailor and Francis, New York NY 10016

2) Concrete Technology by A.R. Santhakumar, Oxford university press, New Delhi

3) Concrete Technology by Neville, Pearson education limited, London

4). Advanced Concrete Technology Constituent materials- John Newman, Ban Seng Choo- London Press.

5) Concrete- P.K. Mehta, P J M Monte

iro,- Prentice Hall, New Jersey

T. E. (CIVIL) PART – II

CV- 325 ELECTIVE – I

RELIABILITY ENGINEERING

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course Objectives:

1) Learning basic concepts of probability theory followed by the reliability methods and reliability analysis for various Civil Engineering Method.
2) Study of the time varying reliability analysis stochastic finite element.
3) Introduction to the reliability analysis of complex real life civil engineering structures using MATLAB and ANSYS software.

Course Outcomes:

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

1) Summarize reliability engineering and its management related to structural reliability.
2) Perform reliability engineering analysis and design the structure by safety consideration using the reliability analysis method.
3) Use FEM software for solving and giving the solution for problem of Civil structures.

SECTION-I

Unit 1: **(06)**

Introduction and review of basic statistics and probability:-

Introduction to structural reliability and its role in civil engineering design. Basic Statistics (Scatter Diagram, Histogram and Frequency Polygon), Theory of Probability, Probability Distributions (Continuous & Discrete), Conditional probability, Common probability distributions. Random Variables, Random vectors and functions of random variables.

Unit 2: **(06)**

Reliability of structures and safety in Civil Engineering:-

General introduction to structural safety and reliability, Reliability Methods, Failure Surface and Definition of Reliability in Standard Normal Space (Cornell's Reliability Index). Concept of uncertainty in reliability-based analysis and design.

Unit 3: **(05)**

Structural analysis and design, load and resistance models.

Unit 4: **(05)**

Reliability analysis method: - First Order Second Moment Method (FORM) for Correlated & Non-Normal Random Variables. Graphical representation of Reliability Index in Standard Normal Space.

SECTION-II

Unit 5: **(05)**

Simulation Methods in Reliability Analysis:- Monte Carlo simulations, Technique, Importance Sampling and Adaptive Sampling.

Unit 6: **(06)**

Design specification, Load and resistance factors in design codes, Load combination, Steel design specifications based on ASD & LRFD, Design of tension members, and Design of beam elements.

Unit 7: **(06)**

System reliability concepts, System and component reliabilities series and parallel models, Connection problems and reliability, Time Varying Reliability Analysis, Load estimation based on ASCE-7 project presentation.

Unit 8: **(06)**

Introduction to Stochastic Finite Element Method.

Case Studies using software (MATLAB & ANSYS) in Batch Mode.

CV- 325 ELECTIVE – I
RELIABILITY ENGINEERING (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

Total eight assignment should be submitted based on each unit with the examples.

TEXT BOOKS:

1) Structural Reliability Analysis and Prediction, R. E. Melchers and John, Wiley & Sons 1999.
2) Reliability of Structures, A. S. Nowak & K. R. Collins, McGraw-Hill, 2000.
3) "Reliability of Structures", Andrzej S. Nowak & Kevin R. Collins, Tata McGraw-Hill.
4) Structural Reliability Analysis & Design, Ranganathan R., Jaico Publishing House, Mumbai, India, 1999.
5) Structural Reliability: Analysis and Prediction, Melchers R E., John Wiley, Chichester, 1999.

REFERENCE BOOKS:

1) "Structural Reliability Analysis and Prediction", Robert E. Melchers and John, Wiley & Sons.
2) Probability, Random Variables and Stochastic Processes, Papoulis A., McGraw-Hill, New York, USA, 1991.
3) Probability, Statistics and Reliability for Engineers and Scientists, Ayyub B M, McCuen R H., Chapman & Hall, Florida, USA, 2000.
4) Probability Concepts in Engineering Planning and Design, Volume-II, Ang A. H. S. & Tang W. H., John Wiley, New York, 1984.
5) Methods of Structural Safety, Madsen H. O., Krenk S. and Lind N. C., Prentice-Hall, Inc, Englewood Cliffs, USA, 1986.

6) Reliability Based Structural Design, Choi S. K., Grandhi R. V. and Canfield R. A., Springer-Verlag, London, UK, 2007.
7) Reliability Assessment Using Stochastic Finite Element Analysis, Haldar A & Mahadevan S., John-Wiely & Sons Inc., New York, USA, 2000.
8) Reliability and Optimization of Structural Systems, Rackwitz R, Augusti G and Borri A., Chapman & Hall, London, UK, 1995.
9) Structural Reliability Using Finite Element Methods, Waarts P H., Delft Univ. Press, Netherland, 2000.

T. E. (CIVIL) PART – II

CV- 325 ELECTIVE – I

FINITE ELEMENT METHOD

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course objectives:

1. To study the strain displacement and linear constitutive relation of any element using finite element techniques
2. To understand the numerical techniques applied in FEM
3. To study isoparametric concepts
4. To analyze frame elements using FEM techniques

Course Outcomes:

Upon successful completion of the course, the students will be able to

1. Demonstrate the displacement models and load vectors
2. Compute the stiffness matrix for isoperimetric elements
3. Analyze plane stress and plane strain problems
4. Analyze one dimensional, two dimensional and 3 dimensional elements using FEM

SECTION – I

Unit 1: **(7)**

Introduction to finite element method: History, applications, Stress strain relationship, strain displacement relationship. Principle of minimum potential energy, variation principle, Rayleigh - Ritz method, Finite element procedure.

Unit 2: **(8)**

Linear Constitutive equations, Matrix displacement equations for bar element, beam element and truss element, element shapes, co-ordinate systems, shape functions, polynomial shape functions,

derivations of shape functions using polynomials, consistent nodal load, Lagrange's interpolation formulae, Shape function in Cartesian and natural co-ordinate system

Unit 3: **(7)**

Bar Element, application to bars with constant and variable cross section subjected to axial forces. Development of element stiffness matrix and nodal load vector for truss and beam

SECTION – II

Unit 4: **(7)**

Pascal's triangle, convergence requirements and compatibility conditions, plane stress and plane strain problems, Triangular elements, CST, LST elements, Rectangular elements, Effect of element aspect ratio, finite representation of infinite bodies.

Unit 5: **(8)**

Concept of iso-parametric element, relation between Cartesian and natural Coordinate system, Jacobian matrix, one and two dimensional iso-parametric elements.

Unit 6: **(8)**

Introduction to three-dimensional problem, various three-dimensional elements, Axisymmetric problems, formulation of stiffness matrix of three dimensional and axisymmetric elements.

CV- 325 ELECTIVE – I

FINITE ELEMENT METHOD (Laboratory)

INTERNAL CONTINUOUS ASSESSMENT (ICA)

A set of tutorials / Problems based on above topics of syllabus

TEXT BOOKS:

1. Introduction to Finite Element Method by C. S. Desai & J. F. Abel.
2. Finite Element Analysis by S. S. Bhavikatti
3. The finite Element Method (Fourth Edition) Vol I & II by O. C. Zienkiewicz & R. L. Taylor

REFERENCE BOOKS:-

1. First Course in the Finite Element Method by Daryl L. Logan
2. Concepts and Applications of Finite Element Analysis by R. D. Cook
3. Introduction to Finite Element in Engineering by T. R. Chandrapatla and Belegundu.

T. E. (CIVIL) PART – II

CV- 325 ELECTIVE – I

EXPERIMENTAL STRESS ANALYSIS

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course objectives:

1) To study the working principles of different types of strain gauges
2) To understand the model analysis
3) To know the fundamentals of photo elastic coatings
4) To study the effects of 2-D photo elasticity
5) To study the working principle of load, pressure and displacement transducers

Course Outcomes:

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

1) Identify the different types of strain gauges
2) Carry out model analysis
3) Apply the concepts of photo elastic coatings
4) Analyze the behavior of 2-D photo elasticity
5) Apply the working principles of transducers

SECTION – I

Unit 1: **(9)**

History of experimental stress analysis, method for generating, applying and measuring forces, fundamental concepts of strain measurement, load cell, proving ring, Huggen burger, Berry, Johnson, Demec optical extensometers.

Unit 2: **(9)**

Electrical resistance strain gauges, properties of grid, backing and cement, different types of wire and foil types strain rosettes, Balancing- Series, parallel.

Unit 3: **(5)**

Dimensional analysis theorem, Model analysis- Simulations, Problems.

SECTION – II

Unit 4: **(9)**

Brittle coating method, general principles, advantages and disadvantages, state of stress and laws of failure, calibration technique, applications, methods of crack detection.

Unit 5: **(14)**

Photo-elasticity – Polariscope and auxiliary instruments, stress optic law, Fringe pattern, isoclinics and stress trajectories materials properties and their values, calibration techniques, application of model results to prototype two dimensional models, compensation techniques, separation of principal stresses.

CV- 325 ELECTIVE – I

EXPERIMENTAL STRESS ANALYSIS (Laboratory)

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The work for Internal Continuous Assessment (ICA) shall consist of a record of set of experiments and exercises based on the theoretical course of the syllabus.

TEXT BOOKS:

1. Applied Stress Analysis - Direlli
2. Experimental Stress Analysis- Dally & Riley, McGraw Hill
3. Experimental Stress Analysis- Srinath, T. McGraw Hill
4. Experimental Stress Analysis & Motion measurements- Dove & Adams

REFERENCE BOOKS:

1. Photo elasticity Vol. I – Frocht
2. Mechanical measurements- Beckwith & Buck
3. Strain Gauge Primer- Perry Lisner

T. E. (CIVIL) PART – II

CV- 325 ELECTIVE – I

OPTIMIZATION TECHNIQUES

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course Objectives:

1. To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems
2. To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology
3. To apply the mathematical results and numerical techniques of optimization theory to Civil Engineering problems.

Course Outcomes:

At the end of this course, students will be able to:

1. Formulate and solve optimization problems and use the results in managerial decision making process.
2. Apply optimization techniques in Civil Engineering problems such as transportation, water supply, etc.
3. Make inventory calculations for resources required in Civil Engineering Projects.

SECTION I

Unit 1: **(04)**

Use of Operations Research in Civil Engineering and Managerial Decision making process. Introduction to Optimization Techniques and their application in Engineering Planning, Design and Construction. Various models; Objective function and constraints, convex and concave functions, regions and sets.

Unit 2: **(06)**

Introduction: Classical optimization techniques, Standard format of optimization problems,

Types of optimization problems, formulation of optimization problems

Unit 3: **(06)**

Linear programming: Formulation of Linear optimization models, Civil engineering applications. Simplex method, Special cases in simplex method, Method of Big M, Two phase method, duality, sensitivity analysis.

Unit 4: **(06)**

Transportation problems: MODI method, shortest route problem, maximum flow problem.

SECTION II

Unit 5: **(05)**

Decision theory (certainty, uncertainty and risk), Decision tree, and Game theory.

Unit 6: **(06)**

Inventory models – deterministic models, probabilistic model, Replacement Models

Unit 7: **(08)**

Introduction to non classical optimization Techniques viz. Artificial Neural Networks, Fuzzy Logic, Genetic algorithms. Introduction to Non-Linear Programming, Dynamic Programming and Integer programming.

Unit 8: **(04)**

Simulation, applications with problem.

CV- 325 ELECTIVE – I

OPTIMIZATION TECHNIQUES (Laboratory)

INTERNAL CONTINUOUS ASSESSMENT (ICA)

ICA consists of at least two exercises on each of the above units.

TEXT BOOKS:

1) Optimization, S. S. Rao, Wiley Eastern Ltd.

2) Operation Research, H. A. Taha, Mac-Millan.

3) Operation Research, Hira and Gupta, S. Chand.

REFERENCE BOOKS:

1) Engineering Optimization, A. Ravindran, K. M. Ragsdell, G. V. Reklaitis, Wiley Publication.

2) Lecture Notes by Dr. Nageshkumar (nptel.iitk.ac.in/courses/Webcourse-contents/IISc-BANG/ OPTIMIZATION METHODS/pdf)

3) Operations Research: Theory and application, J.K. Sharma, Macmillan Publishers

4) Computational Intelligence for Optimization, Authors: Ansari, Nirwan, Hou, Edwin, Springer Publications

T. E. (CIVIL) PART – II

CV- 325 ELECTIVE – I

DISASTER MANAGEMENT

Teaching Scheme:		**Examination Scheme:**	
Lectures:	3Hrs/Week, 3 Credits	**ICA:**	25 Marks
Practical :	2 Hrs/Week, 1 Credit	**ISE:**	30 Marks
		ESE(Theory):	70 Marks

Course Objectives:

1) Study of various disasters, their characteristics, causes and impacts.
2) Acquaint with the various disaster management stages to prevent or reduce losses that occur due to hazards during disaster and emergencies.
3) Provide information regarding various programmes of International, National and State and District Level Agencies for disaster management.

Course Outcomes:

By the end of the course students will be able to

1) Apply various disaster preparedness, mitigation and management techniques.
2) Apply the Geo-informatics techniques for prepare hazard zonation maps for Disaster management.
3) Apply the various schemes and programmes of International, National and State and District Level Agencies for disaster management.

SECTION-I

Unit 1: **(08)**

Environmental Hazards and Disasters

Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology- Landscape Approach- Ecosystem Approach- Perception approach- Human ecology & its application in geographical researches.

Unit 2: **(08)**

Types of Environmental hazards and Disasters:-

Natural disaster and Planetary Hazards

Earthquake Hazards/ disasters- Introduction, general characteristics, mechanism, causes and effects of Earthquakes, prediction, seismic zones, seismic waves, vulnerability, damage potential - magnitude and intensity, Earthquake Hazards in India- Human adjustment, perception and mitigation of earthquake.

Volcanic Hazards/Disasters:- Volcanoes Causes of volcanism, volcanic materials, hazardous effects and impacts of volcanic eruptions.

Landslide and Land Degradation:- Causes, tectonic conditions, erosion, avalanches, rock fall, damage assessment. Landslide prone area in India.

Cyclones and Tsunamis:- Structure and nature of cyclones (Tropical cyclones & Local storms) & tsunamis, characteristics, hazard donation, factors, hazard potential, impact assessment. Cyclone prone areas in India.

Floods:- General characteristics, causes, Flood hazards India, geomorphology and floods, flood forecasting, river and coastal floods, flash floods, lake outburst, risks, environmental planning, flood control and management (Human perception & mitigation).

Droughts:- Cause and Impacts of droughts- Drought hazards in India- Drought control measures.

Man-made Disaster and Extra Planetary Hazards/ Disasters

Man induced Hazards /Disasters-Physical hazards/ Disasters-Soil Erosion

Soil Erosion:- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion, Conservation measures of Soil Erosion.

Mining:- Mining and environment, land & environment degradation and management, Mined land reclamation.

War and Chemicals disaster: - Release of toxic chemicals Hazardous wastes, reactivity, toxicity, nuclear war, biological weapons, armed conflicts, land mines etc.

Sedimentation processes: - Global Sedimentation problems, Regional Sedimentation problems. Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation.

Biodiversity Extinction and Deforestation:- Biodiversity, species at risks, loss of biodiversity, management of species diversity, deforestation its causes & adverse effects.

Biological hazards/ disasters:- Population Explosion.

Unit 3: **(06)**

Disaster Management:- Three Stages

Pre-disaster stage (Preparedness):- Introduction to disaster preparedness, Three A's of disaster preparedness, principles of disaster preparedness, steps in disaster preparedness, Preparing hazard zonation maps, Predictability/ Forecasting & warning, preparing disaster preparedness plan. Land use zoning- Preparedness through (IEC) Information, education and Communication. Disaster resistant house construction- Population reduction in vulnerable areas- Awareness.

Emergency stages: - Planning, mitigation, preparedness, response and recovery.

Post Disaster stage (Rehabilitation):- Physical and Social Infrastructure, Social and economic rehabilitation, Repair and retrofitting, Political Administrative Aspect.

SECTION-II

Unit 4: **(05)**

Natural Disaster Reduction and Management:- Provision of Immediate relief measures to disaster affected people-Prediction of Hazards & Disasters-Measures of adjustment to natural hazards.

Unit 5: **(09)**

Disaster Mitigation:-

Disaster Mitigation through Development: Disaster Mitigation: Basic Concepts, Meteorological and Seismological observation, Structured and Non Structured Mitigation, disaster mitigation strategies, importance of Information and Communication in Disaster Mitigation, Relationship between Disaster and Development, Sustainable Development for Disaster Mitigation, Importance of various Agencies/sectors involved for disaster mitigation.

Education on disasters -Community involvement, The adjustment of Human Population to Natural hazards & disasters. Role of database in Disaster Mitigation, GIS and GPS applications.

Role of Media

Monitoring Management- Programme of disaster research and mitigation of disaster of following organizations. International Council for Scientific Unions (ICSU)-Scientific committee on problems of the Environment (SCOPE), International Geosphere Biosphere programme (IGBP) -

World federation of Engineering Organizations (WFED). National Academy of Sciences-World Meteorological organizations (WMO). Various U.N agencies like UNCRD, IDNDR, WHO, UNESCO, UNICEF, UNEP.

Unit 6: **(09)**

Agencies in Disaster Management

International Agencies: United Nations and its specialized agencies like UNDP, FAO, WHO AEC (Atomic Energy Commission), United Nations Disaster Management Cell, New Delhi. International Federation of Red Cross and Red Crescent Societies (IFRC) and National Red Cross/Red Crescent Societies.

National Agencies: Disaster Management Cell (Ministry of Home Affairs, Govt. of India), National Institute of Disaster Management, Indian Red Cross Society, Planning Commission, National Civil Defense Organization, Bharat Scouts and Guides. Military and Para-Military Forces; Corporate Bodies etc.

State and District Level Agencies: Disaster Management cells at state level and District level, District Magistrate office, Role and Responsibilities of DM in prevention, preparedness, mitigation, relief and rehabilitation; local bodies and role of different functionaries-

CV- 325 ELECTIVE – I

DISASTER MANAGEMENT (Laboratory)

INTERNAL CONTINUOUS ASSESSMENT (ICA)

1. Practical exercise on each unit
2. Each student will be required to prepare a project work of Coastal Ecosystem, Desert Eco System and Mountain Eco System & submit it at the end of year & this will be evaluated by an internal as well as external examination

TEXT BOOKS

1. The Environment as Hazards, Kates, B.I& White, G.F, Oxford, New York, 1978
2. Disaster Management, R.B. Singh, Rawat Publication, New Delhi, 2000.
3. Disaster Management H.K. Gupta, Universities Press, India, 2003.
4. Space Technology for Disaster Mitigation in India (INCED), R.B. Singh, University of Tokyo, 1994.
5. Disaster Management in Hills, Dr. Satender, Concept Publishing Co., New Delhi, 2003.
6. Plan for Earthquake, Disaster, Mitigation, Disaster Management, A.S. Arya, V.K. Sharma, Action IIPA Publication New Delhi, 1994.
7. An overview on Natural and Man-made Disaster & their Reduction, R.K. Bhandani, SIR, New Delhi.
8. Disaster Mitigation, Preparedness, Recovery and Response, P. C. Sinha, SBS Publishers and Distributors Pvt. Ltd.
9. Introduction to International Disaster Management, D. P. Coppola, Butterworth-Heinemann.
10. Disaster Management M. Sharma, Vinod K., NCDM, IIPA, New Delhi, 1994
11. Housing in Disaster prone areas, National Building Organization and U.N. Regional Centre, Mathur G.C., ESCAP, New Delhi, 1986.
12. Disaster Management, Dr. Mrinalini Pandey, Wiley Publication.

REFERENCE BOOKS

1. Disaster Management in India – A Status Report, National Disaster Management Division, Ministry of Home Affairs, Govt. of India, 2004.
2. Disaster Management and Preparedness, Collins Larry R. and Scheind Thomas D. (2000)., Taylor and Francis, 2000.
3. Disaster Management, Sharma V.K., Indian Institute of Public Administration, New Delhi, 1995.
4. National Disaster Response Plan, NCDM, New Delhi, 2001.

5. Manuals on Natural Disaster management in India, M.C. Gupta, National Centre for Disaster Management, IIPA, New Delhi, 2001.
6. Management of Floods, National Disaster Management Authority, Government of India.

T.E. Civil Engineering – II (Semester-VI)

Self Learning Technical courses

A. Student shall select a 'Self Learning Technical Course' from Solapur University, Solapur Technical Course List (Civil Engineering) and appear for its examination, as and when conducted by Solapur University, Solapur. Minimum four assignments for Self Learning Modules at T.E. Part II shall be submitted by the students which shall be evaluated by a Module Coordinator assigned by institute / department.

List of Self Learning Technical Courses from Solapur University, Solapur

1) Geosynthetics and Reinforced Soil Structures
2) Pavement Analysis and Design
3) Planning for Sustainable Development
4) TQM and MIS in Civil Engineering
5) Earthquake Resistant Non Engineered Construction

OR

B. Student with prior approval of the institute shall select and enroll for any 'National Programme on Technology Enhanced Learning (NPTEL)' course from Civil Engineering domain/Interdisciplinary course, with minimum eight weeks duration, complete necessary assignments and appear for certificate examination as per the NPTEL schedule during respective semester.

More details about NPTEL are available at http://nptel.ac.in

T.E. (CIVIL ENGINEERING) PART- II

CV- 326 Geosynthetics and Reinforced Soil Structures

(Self Learning Technical Course)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

Unit 1:

Introduction: Historical background of reinforced soil, Principles of reinforced soil through Mohr circle analysis.

Different types of geosynthetics: Types of geosynthetics like geotextiles, geogrids, geonets, geocells, geo-composites, their manufacturing methods.

Unit 2:

Testing methods for geosynthetics: Techniques for testing of different index properties, strength properties, Apparent Opening Size, In-plane and cross-plane permeability tests, assessment of construction induced damage, extrapolation of long term strength properties from short term tests.

Unit 3:

Reinforced Soil retaining walls: Different types of walls like wrap-around walls, full-height panel walls, discrete-facing panel walls, modular block walls Design methods as per BS-8006 and FHWA methods Construction methods for reinforced soil retaining walls.

Reinforced soil slopes: Basal reinforcement for construction on soft clay soils, construction of steep slopes with reinforcement layers on competent soils, Different slope stability analysis methods like planar wedge method, bi-linear wedge method, circular slip methods.

Unit 4:

Erosion control on slopes using geosynthetics. Applications in foundations: Binquet and Lee's approach for analysis of foundations with reinforcement layers.

Drainage and filtration applications of geosynthetics: Different filtration requirements, filtration in different types of soils and criteria for selection of geotextiles, estimation of flow of water in retaining walls, pavements, etc. and selection of geosynthetics.

Unit 5:

Pavement application: Geosynthetics for separation and reinforcement in flexible pavements, design by Giroud-Noiray approach, reflection cracking and control using geosynthetics. Use of geosynthetics for construction of heavy container yards and railway lines.

Construction of landfills using geosynthetics: Different components of modern landfills, collection techniques for leachate, application of different geosynthetics like geonets, geotextiles for drainage in landfills, use of geomembranes and Geosynthetic Clay Liner (GCL) as barriers

ASSIGNMENTS

The work for Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus. (One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the work designated for Internal Continuous Assessment (ICA).

TEXT BOOKS

1. Koerner, R.M. "Designing with Geosynthetics", Prentice Hall, New Jersey, USA, 4th edition, 1999.
2. Jewell, R.A., "Soil Reinforcement with Geotextiles", Special Publication No. 123, CIRIA, Thomas Telford. London, UK, 1996.
3. Geosynthetics - New Horizons, Eds. G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana, Asian Books Private Ltd., New Delhi, 2004.

REFERENCE BOOKS

1. Geosynthetics Asia 1997: Select papers by C.V.J. Varma, G. Venkatappa Rao and A.R.G. Rao ,1998.
2. Geosynthetics for Trails in Wet Areas: 2008, Edition by James Scott Groenier , Bibligov Publishers, 2012.
3. Fundamentals of Geosynthetic Engineering by Sanjay Kumar Shukla and Jian-Hua Yin, Taylor & Francis, 2008.

T.E. (CIVIL ENGINEERING) PART- II

CV- 326 Pavement Analysis and Design

(Self Learning Technical Course)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

Unit 1:

Types of pavement – Factors affecting design of pavements – wheel loads –ESWL Concept- tyre pressure – contact pressure, Material characteristics – Environmental and other factors.

Unit 2:

Stresses in flexible pavement – layered systems concept – one layer system – Boussinesq Two layer system – Burmister Theory for Pavement Design.

Stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction – stresses due to warping, stresses due to loads, stresses due to friction.

Unit 3:

Pavement design: CBR Method of Flexible Pavement Design- IRC method of flexible pavement design.- AASHO Method of Flexible Pavement design IRC method of Rigid pavement design – Importance of Joints in Rigid Pavements- Types of Joints – Use of Tie Bars and Dowell Bars.

Unit 4:

Highway Materials – Soil, Aggregate and Bitumen- Tests on aggregates – Aggregate Properties and their Importance- Tests on Bitumen – Bituminous Concrete- Requirements of Design Mix- Marshall's Method of Bituminous Mix design. Highway construction – Construction of Earth Roads- Gravel Roads – WBM Roads- Bituminous Pavements- Cement Concrete Roads- Steps in Construction- Reinforced Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization and Soil-lime stabilization.

Unit 5:

Need for Highway Maintenance- Pavement Failures- Failures in Flexible Pavements-Types and Causes-Rigid Pavement Failures- Types and causes- Pavement Evaluation- Benkleman Beam method- Strengthening of Existing Pavements- Overlays.

ASSIGNMENTS

The work for Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus. (One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the work designated for Internal Continuous Assessment (ICA).

TEXT BOOKS

1. Highway Engineering – S. K. Khanna & C. J. Justo, Nemchand & Bros., 7th Edition (2000).
2. Principles and Practices of Highway Engineering – Dr. L. R. Kadiyali & Dr. N. B. Lal – Khanna Publishers – (2003).

REFERENCE BOOKS

1. Principles of pavement design – Yoder & wit zorac – Jhonwilley & Sons.
2. CODES: IRC Code for flexible pavement – IRC – 37 -2001. v2. IRC Code for Rigid pavement – IRC – 58 – 2002.
3. Pavement Analysis and Design by Yang H. Huang (2008), Prentice Hall Publications.
4. Analytical Pavement Design Based on Method of Equivalent Thickness by Monower Sadique Ceng, LAP LAMBERT Academic Publishing.

T.E. (CIVIL ENGINEERING) PART- II

CV- 326 Planning for Sustainable Development

(Self Learning Technical Course)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

Unit 1:

Sustainable Development-explains and critically evaluates the concept of sustainable development, Environmental degradation and poverty Sustainable development: its main principles, the evolution of ideas about sustainability, strategies for promoting sustainable development, resistances to the concept, and some alternative approaches. Examine some important current issues and areas of debate in relation to sustainable development.

Unit 2:

Innovation for sustainable development- Environmental management and innovation strategies.

Unit 3:

Societal transformations. Institutional theory.

Unit 4:

Governance for sustainable development. Policy responses to environmental degradation.

Unit 5:

Capacity development for innovation. Research methods.

ASSIGNMENTS

The work for Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus. (One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the work designated for Internal Continuous Assessment (ICA).

TEXT BOOKS

1. Harris, J.M. (2204) Basic Principles for Sustainable Development, Global Development and Environment Institute, working paper 00-04. Available at: http://ase.tufts.edu/gdae/publications/Working_Papers/Sustainable%20Development.PDF
2. Robinson, J. (2004) Squaring the circle? Some thoughts on the idea of sustainable development Ecological Economics 48(4): 369-384.
3. Hjorth, P. and A. Bagheri (2006) Navigating towards Sustainable Development: A System Dynamics Approach, Futures 38: 74-92.

REFERENCE BOOKS

1. Mog, J.M. (2004) „Struggling with Sustainability – A Comparative Framework for Evaluating Sustainable Development Programs", World Development 32(12): 2139–2160. IISD commentary on the OECD's Draft Principles for International Investor Participation in Infrastructure (PDF – 68 kb)
2. Arundel, A., R. Kemp, and S. Parto (2004) Indicators for Environmental Innovation: What and How to Measure, forthcoming in International Handbook on Environment and Technology Management (ETM), edited by D. Annandale, J. Phillimore and D. Marinova, Cheltenham, Edward Elgar.
3. Douthwaite, B. (2002) Enabling Innovation. A practical guide to understanding and fostering innovation, London

T.E. (CIVIL ENGINEERING) PART- II

CV- 326 TQM AND MIS IN CIVIL ENGINEERING

(Self Learning Technical Course)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

Unit 1:

Quality – various definitions and interpretation. Importance of quality in construction. Factors affecting good quality of construction. Importance of quality on a project in the context of global challenges.

Unit 2:

a) Difference between, quality control, quality assurance, total quality control and total quality management (TQM)
b) Process based approach for achieving TQM. Study of ISO 9001 principles
c) Quality manual – Importance, contents, documentation. Importance of check-lists in achieving quality. Typical checklist for concreting activity, formwork activity, steel reinforcement activity.

Unit 3:

TQM – Necessity, advantages. Six sigma as a tool in TQM. Supply chain management as a tool in TQM. Benchmarking in TQM. Kaizen in TQM. Defects in construction and measures to prevent rectify defects.

Unit 4:

Introduction to Management Information systems (MIS)

Overview, Definition. MIS and decision support systems, Information resources, management subsystems of MIS.

Management information system structure based on management activity whether for operational control, management control or strategic planning.

Unit 5:

a) Survey of information systems technology w. r. t hardware, software, communications technology, data processing, Information processing.
b) Concepts of information, planning and control, Information based support systems. Development of an MIS for a construction organization associated with building works.

ASSIGNMENTS

The work for Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus. (One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the work designated for Internal Continuous Assessment (ICA).

TEXT BOOKS

1. Total Engineering Quality Management – Sunil Sharma – Macmillan India Ltd.
2. Quality Control and Total Quality Management by P. L. Jain- Tata McGraw Hill Publ. Company Ltd.
3. Total Project Management – The Indian Context - P. K. Joy Macmillan India Ltd.

REFERENCE BOOKS

1. Management –Principal, process and practices by Bhat – Oxford University Press.
2. Financial management by Shrivastava- Oxford University Press
3. Management Information Systems – Gordon B. Davis, Margrethe H. Olson – Tata McGraw Hill Publ. Co.

T.E. (CIVIL ENGINEERING) PART- II

CV- 326 Earthquake Resistant Non Engineered Construction

(Self Learning Technical Course)

		Examination Scheme:	
Credits:	2	**ESE(Theory):**	50 Marks

Unit 1:

Introduction: General effects of an earthquake, terminology, structure of earth, earthquake effects. Ground shaking effect on structures: Inertia forces, seismic load, factors affecting seismic load, nature of seismic stresses, important parameters in seismic design, Factors affecting damage, building configuration, opening size, rigidity distribution, ductility, foundation, construction quality.

Unit 2:

General concepts of earthquake resistant design: categories of building, seismic zones, importance of building, bearing capacity of foundation soil, combination of parameters. Planning of building, choice of site, structural design , fire resistance, structural framing, requirements of structural safety.

Unit 3:

Buildings in bricks and other masonry units: Introduction , Typical damage and failure of masonry buildings: Non- structural damage, Damage and failure of bearing walls, Failure of ground, failure of roofs and floors, Causes of damage in masonry buildings , Typical strengths of masonry , General construction aspects, Horizontal reinforcement in walls , Vertical reinforcement in walls.

Unit 4:

Stone buildings: Introduction, Typical damage and failure of stone buildings, Typical structural properties, General construction aspects: overall dimensions, mortar, openings in walls, masonry bond, horizontal reinforcing of walls, and vertical reinforcing of walls.

Unit 5:

Restoration and strengthening of buildings: Introduction, Techniques to restore original strength, Planner modifications and strengthening of walls: Inserting new walls, strengthening existing walls, external binding, and other points.

ASSIGNMENTS

The work for Internal Continuous Assessment (ICA) will consist of total five assignments, based on syllabus. (One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the work designated for Internal Continuous Assessment (ICA).

TEXT BOOKS

1. Elements of Earthquake Engineering- Jai Krishna, South Asian Pub. New Delhi.
2. Earthquake Resistant, Design of Masonry and Timber Structures – A.S. Arya.

REFERENCE BOOKS

1. Manual of Earthquake Resistant Non engineering Construction, University of Roorkee.
2. Earthquake Tips published by NICEE, IIT Roorkee.
3. Government of Maharashtra Earthquake resistant Design of house guiding lines and assessment of damages.
4. IS – 4326:1993 Earthquake resistant design and construction of buildings

T.E. (CIVIL ENGINEERING) PART II

CV- 327 PROJECT ON STEEL STRUCTURES

Teaching Scheme:		**Examination Scheme:**	
Drawings:	4Hrs/Week, 2 Credits	**ICA:**	50 Marks
		ESE(Lab):	25 Marks

Course Objectives

This course aims to provide the knowledge of the following aspects of the steel structures as per IS 800: 2007(General Construction in Steel)

1. The detailed structural design and drawing of industrial shed with roof truss, gantry girder, roof and gantry columns, bracing system, column bases
2. The detailed structural design and drawing of building frames/ foot bridge/ welded plate girder/Offshore structures
3. To provide training on application software for analysis and design of steel structures

Course Outcomes

Upon successful completion of the course, the students will be able to

1. Design the various components of Industrial shed with roof truss or portal frame or gable frame
2. Prepare drawings of Industrial shed with roof truss including Gusset plates, Bearing plates and Foundation details
3. Design the various components of Building frame/Foot bridge/Welded plate girder
4. Prepare drawings of Building frame/Foot bridge/Welded plate girder in details of the sections with bolted and welded system
5. Analyze any one of the structure using any standard Civil Engineering software
6. Analysis and Design report generation as per the requirements of Civil Engineering Industry.

PROJECT ON STEEL STRUCTURES (Laboratory)
INTERNAL CONTINUOUS ASSESSMENT (ICA)

It shall consist of detailed structural design and drawing of the following steel structure along with necessary drawings.

1. INDUSTRIAL SHED

Design of industrial shed including roof truss, purlin, gantry girder, roof and gantry columns, bracing system, column bases and connections.

2. ANY ONE of the following:

a. **Welded Plate Girder:**
   Design of welded plate girder, design of cross section, curtailment of flange plates, stiffeners and their connections.

b. **Foot Bridge**
   Influence lines, cross beam, main truss, Raker, joint Details, support details

c. **Building Frames**
   Building with Secondary and main beams, column and column bases, beam-to-beam connection, column-beam-connection, design of typical members.

d. **Offshore Structures**
   Offshore structures containing elements like jackets, topside platforms, equipment foundations etc. Further, these components can be designed using circular and hollow square sections etc.

Note:

1. Sample verification of analysis results shall be made by using software for any one problem.
2. Maximum number of students in a group not more than three to five for design.

Site visits: Report should contain structural details with sketches.

TEXT BOOKS

1. Design of Steel Structures, N. Subramanian, Oxford, 2008
2. Limit State Design of Steel Structures, S.K. Duggal.

3. Design of steel structure by Limit State Method as per IS: 800- 2007 by Bhavikatti S. S, I K International Publishing House, New Delhi
4. Limit state design in Structural Steel by Dr. M. R. Shiyekar

REFERENCE BOOKS

1. Limit state design of Steel Structure by V. L. Shah & Gore, Structures Publication, Pune
2. Limit State Design of Steel Structures by D. Ramchandra & Virendra Gehlot, Scientific Publishers
3. Design of Steel Structures by K. S. Sai Ram, published by Dorling Kindersley (India) Pvt. Ltd.
4. Structural Design and Drawing Reinforced Concrete and Steel by N. Krishnaraju, Universities Press (India) Pvt. Ltd. Hyderabad.
5. Teaching Resource Material by INSDAG
6. Indian Standard Codes: IS 800-2007, IS 875-1987 Bureau of Indian Standards.
7. Steel Tables SP: 6(1) and SP: 6(6)
8. Dynamic Analysis and Design of Offshore Structures , Srinivasan Chndrasekaran
9. Offshore Structures : Design, Construction and Maintenance by Mohamed A. EI-Reedy

T.E. (CIVIL ENGINEERING) PART- II

CV- 328 Mini Project

Teaching Scheme:		Examination Scheme:	
Practical :	2 Hrs/Week, 1 Credit	**ICA:**	50 Marks

Student/s shall carry out 'Mini Project' in any one of the following subjects: Structural Mechanics-III, Geotechnical Engg. II, Environmental Engg. II or Engineering Management-I, by preferably employing relevant application software.

The project shall consist of Civil Engineering Prototype design, Working models, Laboratory experiments, Process modification/development, Simulation, Software development, Data analysis, Survey etc.

The student is required to submit a 'Project Report' based on the work.

The Mini project shall be assessed by the domain subject teachers for ICA.

T.E. (CIVIL ENGINEERING) PART- II

CV- 329 Assessment of Field Training Report

		Examination Scheme:	
Credit:	1	**ICA:**	25 Marks

Students shall undergo a field training of at least 15 days in the winter vacation after T.E. Civil Part I and submit the field training report, which shall be assessed by faculty associated with Engineering Management-I, in T.E. Civil Part II.