Scheme of Examination & Detailed Syllabus of B.Tech (CE) 3rd Year

(5th & 6th Semester)

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Scheme B.Tech. (Civil Engineering) 3rd year

SEMESTER-5					
Course Code	**Course Title**	**Workload/Credit**			
		Theory	**Tutorial**	**Practical/ Drawing**	**Total**
PC/CE/10-T	Design of Steel Structures-I	3/3	-	-	3/3
PC/CE/11-T	Structural Analysis-III	3/3	-	-	3/3
PC/CE/12-T	Hydrology	3/3	-	-	3/3
PE/CE/1-T to PE/CE/4-T	**Program Elective-I**	3/3	-	-	3/3
PE/CE/5-T to PE/CE/8-T	**Program Elective-II**	3/3	-	-	3/3
	Open Elective-I to be opted from courses offered by other Department	3/3	-	-	3/3
PC/CE/11-P	Structural Analysis-II Lab	-	-	2/1	2/1
ESC/7-P	Civil Engineering Materials Testing & Evaluation –I Lab	-	-	2/1	2/1
EEC/CE/1-P	Survey Camp*	-	-	-	-/4
Total		**18/18**	**-**	**4/2**	**22/24**
Open Elective-I :- Students are required to study one elective subject from any other Department in 5th Semester					

* Internal evaluation

Program Elective-I

Course Code	Course Name	L	T	P/D	Credits
PE/CE/1-T	Highway Engineering	3	-	-	3.0
PE/CE/2-T	Highway Construction & Management	3	-	-	3.0
PE/CE/3-T	Highway and Traffic Engineering	3	-	-	3.0
PE/CE/4-T	Pavement Materials and Design	3	-	-	3.0

Program Elective-II

Course Code	Course Name	L	T	P/D	Credits
PE/CE/5-T	Geotechnology	3	-	-	3.0
PE/CE/6-T	Foundation Engineering	3	-	-	3.0
PE/CE/7-T	Geotechnical Design	3	-	-	3.0
PE/CE/8-T	Analysis and Design of Sub-Structures	3	-	-	3.0

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SEMESTER-6					
Course Code	**Course Title**	**Workload/Credit**			
		Theory	**Tutorial**	**Practical/ Drawing**	**Total**
PC/CE/13-T	Design of Steel Structures-II	3/3	-	-	3/3
PC/CE/14-T	Design of Concrete Structures-I	3/3	-	-	3/3
PE/CE/9-T to PE/CE/12-T	**Program Elective-III**	3/3	-	-	3/3
PE/CE/13-T to PE/CE/16-T	**Program Elective-IV**	3/3	-	-	3/3
	Open Elective-II to be opted from courses offered by other Department	3/3	-	-	3/3
MC/7-T*	Disaster Preparedness & Planning Management	3/-	-	-	3/-
PC/CE/14-P	Concrete Testing Lab	-	-	2/1	2/1
PC/CE/15-P	Environmental Engg.-I Lab	-	-	2/1	2/1
PC/CE/16-P	Irrigation Engineering (Drawing)	-	-	2/1	2/1
ESC/8-P	Civil Engineering Materials Testing & Evaluation –II Lab	-	-	2/1	2/1
Total		**18/15**	**-**	**8/4**	**26/19**
Note: Students shall devote 6-8 weeks to Internship/Training after 6th semester examination outside the College campus at approved works.					
Open Elective- II :- Students are required to study one elective subject from any other Department in 6th Semester					

*Non-credit qualifying mandatory courses. The assessment will be completely internal.

Note: Students will be allowed to use non-programmable scientific calculators only; however, sharing of calculator should not be permitted.

Program Elective-III

Course Code	Course Name	L	T	P/D	Credits
PE/CE/9-T	Water Supply & Treatment	3	-	-	3.0
PE/CE/10-T	Environment Engineering	3	-	-	3.0
PE/CE/11-T	Environmental Impact Assessment and Life Cycle Analysis	3	-	-	3.0
PE/CE/12-T	Water and Air Quality Modelling	3	-	-	3.0

Program Elective-IV

Course Code	Course Name	L	T	P/D	Credits
PE/CE/13-T	Irrigation Engineering	3	-	-	3.0
PE/CE/14-T	Design of Hydraulic Structures	3	-	-	3.0
PE/CE/15-T	Urban Hydrology and Hydraulics	3	-	-	3.0
PE/CE/16-T	Groundwater Engineering	3	-	-	3.0

SEMESTER –V

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DESIGN OF STEEL STRUCTURES-I

Course code	**PC/CE/10-T**			
Category	**Program Core**			
Course title	**Design of Steel Structures-I**			
Scheme and credits	**L**	**T**	**Credits**	
	3	**-**	**3.0**	
Course Assessment Methods	**Internal Examination (30 marks):** • Three minor tests each of 20 marks including third minor in open book mode will be conducted. The average of the highest marks obtained by a student in the any of the two minor examinations will be considered. • Class Performance will be measured through percentage of lectures attended (04 marks) • Assignments, quiz etc. will have weightage of 06 marks			
	End semester examination (70 marks): • Nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Two questions are to be set from each unit. All questions will carry equal marks. • A candidate is required to attempt 05 questions in all, one compulsory and remaining four questions selecting one from each of the four units.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Analyze the material properties of steel.	**L4(Analyzing)**
CO2.	Estimate the design parameters for beams, columns, foundations etc.	**L5(Evaluating)**
CO3.	Evaluate the shear capacity of beams and design web bearing stiffeners.	**L5(Evaluating)**
CO4.	Make use of Indian standard code for different steel designs.	**L3(Applying)**
CO5.	Design the components of Industrial roofs using plate and gantry girders.	**L6(Creating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

UNIT-I

Introduction: Limit State Method of Design based on IS: 800-2007, Properties of structural steel I.S. Rolled sections and I.S. specification.

Connections: Importance, various types of connections, simple and moment resistant, riveted, bolted and welded connections.

Design of Tension Members: Introduction, types of tension members, net sectional areas, design of tension members, lug angles and splices.

UNIT-II

Design of Compression Members: Introduction, effective length and slenderness ratio, various types of sections used for columns, built up columns, necessity, design of built up

columns, laced and battened columns including the design of lacing and battens, design of eccentrically loaded compression members.

Column Bases and Footings: Introduction, types of column bases, design of slab base and gusseted base, design of gusseted base subjected to eccentrically loading, design of grillage foundations.

UNIT-III

Design of Beams: Introduction, types of sections, general design criteria for beams, design of laterally supported and unsupported beams, design of built up beams, web buckling, web crippling and diagonal buckling.

UNIT-IV

Gantry Girders: Introduction, various loads, specifications, design steps of a gantry girder.

Plate Girder: Introduction, elements of plate girder, design steps of a plate girder, necessity of stiffeners in plate girder, various types of stiffeners, web and flange splices (brief introduction), Curtailment of flange plates.

Books:

1. Design of steel structures, A. S. Arya & J. L. Ajmani, Nemchand & Bros., Roorkee.
2. Design of steel structures, M. Raghupati, TMH Pub., New Delhi.
3. Design of steel structures, S. M. A. Kazmi &S. K. Jindal, Prentice Hall, New Delhi.
4. Design of steel structures, S. K. Duggal, TMH Pub., New Delhi.
5. Design of steel structures, Dr. N.R. Chandak, S.K. Kataria & Sons, New Delhi.
6. IS code: 800-2007, General Construction in steel-Code of Practice

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1.	**1**	**3**	**1**	**3**	**1**	**1**	-	-	-	-	-	-	3	2	3
CO2.	**2**	**1**	**1**	**3**	**1**	**1**	-	-	-	-	-	-	3	3	3
CO3.	**2**	**3**	**3**	**1**	**1**	**1**	-	-	-	-	-	-	3	2	3
CO4.	**3**	**1**	**1**	**1**	**1**	**1**	-	-	-	-	-	-	3	3	3
CO5.	**3**	**2**	**2**	**1**	**1**	**1**	-	-	-	-	-	-	3	3	3
3 –High 2-Medium 1-Low															

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SRUCTURAL ANALYSIS-III

Course code	**PC/CE/11-T**			
Category	**Program Core**			
Course title	**Structural Analysis-III**			
Scheme and credits	**L**	**T**	**Credits**	
	3	**0**	**3.0**	
Course Assessment Methods	**Internal Examination (30 marks):** • Three minor tests each of 20 marks including third minor in open book mode will be conducted. The average of the highest marks obtained by a student in the any of the two minor examinations will be considered. • Class Performance will be measured through percentage of lectures attended (04 marks) • Assignments, quiz etc. will have weightage of 06 marks			
	End semester examination (70 marks): • Nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Two questions are to be set from each unit. All questions will carry equal marks. • A candidate is required to attempt 05 questions in all, one compulsory and remaining four questions selecting one from each of the four units.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Understand the basic application of mechanics involved in complex structures.	**L2(Understanding)**
CO2.	Analyze beam and arch structures for different complex load combinations.	**L4(Analyzing)**
CO3.	Estimate the influence lines for statically determinate and indeterminate structures.	**L5(Evaluating)**
CO4.	Analyze statically indeterminate structures using matrix (stiffness) method	**L4(Analyzing)**

***Revised Bloom's Taxonomy Action verbs/Levels**

UNIT-I

Influence Line (I.L.):
Introduction, influence lines for three hinged and two hinged arches, load position for Maximum S.F. and B.M. at a section in the span.

Influence Line for statically indeterminate Beams:
Muller-Breslau Principle, I.L. for B.M. & S.F. for continuous Beams.

UNIT-II

Fixed Arches:
Expression for H and B.M. at a section, Elastic centre.

Rolling Loads:
Introduction, Single concentrated load, uniformly distributed load longer than span, shorter than span, two point loads, several point loads, Max. B.M. and S.F. Absolute, Max. B.M.

UNIT-III

Kani's Method:

Analysis of continuous beams and simple frames, analysis of frames with different column lengths and end conditions of the bottom storey.

UNIT-IV

Approximate Analysis of frames by Portal method & Cantilever method for:

(i) Vertical loads, (ii) Lateral loads.

Matrix Methods

Introduction, Stiffness Coefficients, Flexibility Coefficients, Development of Flexibility and Stiffness matrices for plane frame, Global axis and local axis, Analysis of plane, pin jointed and rigid jointed frames.

Books Recommended:

1. Indeterminate structures, R. L. Jindal S. Chand & Co., New Delhi.
2. Advanced Structural Analysis-A. K. Jain, Nem Chand & Bros., Roorkee.
3. Theory of Structures- Vol. I&II,-S. P. Gupta & G. S. Pandit, Tata McGraw Hill, New Delhi.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	3	2	2	1	2	1	-	-	-	-	-	-	3	2	1
CO2.	3	1	1	2	1	1	-	-	-	-	-	-	3	2	1
CO3.	3	2	2	2	1	1	-	-	-	-	-	-	3	2	1
CO4.	3	2	2	2	1	1	-	-	-	-	-	-	3	2	1
3 –High 2-Medium 1-Low															

HYDROLOGY

Course code	**PC/CE/12-T**			
Category	**Program Core**			
Course title	**Hydrology**			
Scheme and credits	**L**	**T**	**Credits**	
	3	**0**	**3.0**	
Course Assessment Methods	**Internal Examination (30 marks):** • Three minor tests each of 20 marks including third minor in open book mode will be conducted. The average of the highest marks obtained by a student in the any of the two minor examinations will be considered. • Class Performance will be measured through percentage of lectures attended (04 marks) • Assignments, quiz etc. will have weightage of 06 marks			
	End semester examination (70 marks): • Nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Two questions are to be set from each unit. All questions will carry equal marks. • A candidate is required to attempt 05 questions in all, one compulsory and remaining four questions selecting one from each of the four units.			

Course outcomes:

Sr. No	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Examine hydrologic mass balance in a closed basin.	**L4(Analyzing)**
CO2.	Identify the different types of precipitation/source of water.	**L3(Applying)**
CO3.	Analyze unit hydrographs based on stream-flow data.	**L4(Analyzing)**
CO4.	Analyze and determine groundwater drawdown based on water well withdrawal	**L5(Evaluating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

UNIT-I

Introduction: Hydrologic cycle, scope and application of hydrology to engineering problems, drainage basins and its characteristics, stream geometry, hypsometric curves.

Precipitation: Forms and types of precipitation, characteristics of precipitation in India, measurement of precipitation, recording and non-recording rain-gauge, rain-gauge station, rain-gauge network, estimation of missing data, presentation of rainfall data, mean precipitation, depth -area -duration relationship, frequency of point rainfall, intensity - duration- frequency curves, probable max. precipitation.

UNIT-II

Evaporation & Transpiration: Process, evaporimeters and empirical relationships, analytical method, reservoir evaporation and methods of its control, transpiration, evapotranspiration and its measurement, Penman's equation and potential evapotranspiration.

Infiltration: Infiltration process, initial loss, infiltration capacity and measurement of infiltration, infiltration indices.

UNIT-III

Runoff: Factor affecting run-off, estimation of runoff, rainfall-run off relationships, measurement of stage-staff gauge, wire gauge, automatic stage recorder and stage hydrograph, measurement of velocity-current meters, floats, area velocity method, moving boat and slope area method, electromagnetic, ultra-sonic and dilution methods of stream flow measurement, stage discharge relationship.

Hydrograph: Discharge hydrograph, components and factors affecting shape of hydrograph, effective rainfall, unit hydrograph and its derivation, unit hydrograph of different durations, use and limitations of UH, Flood frequency methods, Gumbel's method, graphical method, design flood.

UNIT-IV

Ground Water: Occurrence, types of aquifers, compressibility of aquifers, water table and its effects on fluctuations , wells and springs, movement of ground water, Darcy's law, permeability and its determination, porosity, specific yield and specific retention, storage coefficient, transmissibility.

Well Hydraulics: Steady state flow to wells in unconfined and confined aquifers.

Books:

1 Engineering Hydrology by K. Subramanya, TMH, New Delhi
2 Hydrology by H. M. Raghunath, New Age International (P) Limited, Publishers, New Delhi.
3 Hydrology for Engineers by Linsely, Kohler, Paulhus.
4 Elementary Hydrology by V.P.Singh, Prentice-Hall of India Private Limited, New Delhi.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	3	3 3	2	2	1	1	-	-	1	-	-	3	2	1	1
CO2.	3	2 2	2	1	1	-	-	-	-	-	-	3	2	1	1
CO3.	2	3 3	2	1	2	-	-	-	-	-	-	2	3	1	1
CO4.	3	2 3	2	1	1	-	-	-	-	-	-	3	3	1	1
3 –High 2-Medium 1-Low															

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STRUCTURAL ANALYSIS –II Lab

Course code	**PC/CE/11-P**			
Category	**Program Core**			
Course title	**Structural Analysis -II Lab**			
Scheme and credits	**L**	**P**	**Credits**	
	-	**2**	**1.0**	
Course Assessment Methods	**Course Assessment Methods (Internal: 50; External: 50)** The internal and external assessment is based on the level of participation in laboratory Sessions, timely submission of experiments/assignments, the quality of solutions designed for the assignments, the performance in VIVA-VOCE, the quality of laboratory file and ethical practices followed. There will be a continuous process for laboratory course evaluation. Two internal examinations (each of 50 marks) for the laboratory courses (Minor Laboratory Evaluations: MLE I and MLE II) will be conducted in the week before or after the internal examinations for the theory courses. The overall internal marks will be calculated as the average of the two minor laboratory course evaluations. The course coordinator will conduct these minor evaluations in the slots assigned to them as per their timetable. The Chairperson of the Department will only notify the week for the internal laboratory course evaluations. The marks for MLE I and MLE II must be submitted within a week of the conduct of these laboratory course evaluations. The external examination will be conducted by external examiner appointed by the Controller of Examination along with the internal examiner, preferably the laboratory course coordinator, appointed by the Chairperson of the Department. The final practical examination of duration three hours will be conducted only in groups of 20-25 students. The Course Coordinator/Internal Examiners/External Examiners will maintain and submit the bifurcation of marks obtained by the students in internal as well as external evaluations in the Performa (attached herewith as Annexure II and III) to the respective departments in addition to submitting and uploading of overall marks on the university portal as per the requirement of the result branch. The laboratory course coordinator will also conduct laboratory course exit survey and, compute and submit the attainment levels of the laboratory course based on direct and indirect evaluation components and submit it to the Chairperson office along with the internal assessment marks.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Relate the basic application of mechanics involved commonly in the structures.	**L2(Understanding)**
CO2.	Inspect the desired values of the resultant action in response to the agitation on the structures.	**L4(Analyzing)**
CO3.	Analyze the structures using the slope and deflection approach	**L4(Analyzing)**
CO4.	Analyze the trusses using simplified approach.	**L4(Analyzing)**

***Revised Bloom's Taxonomy Action verbs/Levels**

LIST OF EXPERIMENTS:

1. Experiment on a two hinged arch for horizontal thrust & influence line for Horizontal thrust.
2. Experimental and analytical study of a 3-bar pin-jointed Truss.

3. Experimental and analytical study of deflections for unsymmetrical bending of a Cantilever beam.
4. Experimental and analytical study of an elastically coupled beam.
5. Sway in portal frames - demonstration.
6. To study the cable geometry and statics for different loading conditions.
7. To plot stress-strain curve for concrete.

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1.	**2**	**3**	**1**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**
CO2.	**2**	**3**	**1**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**
CO3.	**2**	**3**	**1**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**
CO4.	**2**	**3**	**1**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**
3 –High 2-Medium 1-Low															

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CIVIL ENGINEERING MATERIALS TESTING & EVALUATION-I LAB

Course code	**ESC/7-P**			
Category	**Engineering Science Course**			
Course title	**Civil Engineering Materials Testing & Evaluation-I Lab**			
Scheme and credits	**L**	**P**	**Credits**	
	-	**2**	**1.0**	
Course Assessment Methods	**Course Assessment Methods (Internal: 50; External: 50)** The internal and external assessment is based on the level of participation in laboratory Sessions, timely submission of experiments/assignments, the quality of solutions designed for the assignments, the performance in VIVA-VOCE, the quality of laboratory file and ethical practices followed. There will be a continuous process for laboratory course evaluation. Two internal examinations (each of 50 marks) for the laboratory courses (Minor Laboratory Evaluations: MLE I and MLE II) will be conducted in the week before or after the internal examinations for the theory courses. The overall internal marks will be calculated as the average of the two minor laboratory course evaluations. The course coordinator will conduct these minor evaluations in the slots assigned to them as per their timetable. The Chairperson of the Department will only notify the week for the internal laboratory course evaluations. The marks for MLE I and MLE II must be submitted within a week of the conduct of these laboratory course evaluations. The external examination will be conducted by external examiner appointed by the Controller of Examination along with the internal examiner, preferably the laboratory course coordinator, appointed by the Chairperson of the Department. The final practical examination of duration three hours will be conducted only in groups of 20-25 students. The Course Coordinator/Internal Examiners/External Examiners will maintain and submit the bifurcation of marks obtained by the students in internal as well as external evaluations in the Performa (attached herewith as Annexure II and III) to the respective departments in addition to submitting and uploading of overall marks on the university portal as per the requirement of the result branch. The laboratory course coordinator will also conduct laboratory course exit survey and, compute and submit the attainment levels of the laboratory course based on direct and indirect evaluation components and submit it to the Chairperson office along with the internal assessment marks.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Inspect the size of soil particles at different sites.	**L4(Analyzing)**
CO2.	Compare the density of soil.	**L4(Analyzing)**
CO3.	Deduct the different soil properties under different conditions	**L5(Evaluating)**
CO4.	Determine the ultimate bearing capacity of soil.	**L5(Evaluating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

LIST OF EXPERIMENTS:

1. Grain Size Analysis-Hydrometer method.
2. Shrinkage Limit Determination.
3. Relative Density of Granular Soils.

4. Consolidated Drained (CD) TriaxialTest.
5. Consolidated Undrained (CU) Triaxial Test with Pore Water Pressure measurement.
6. Consolidation Test.
7. Undisturbed Sampling.
8. Standard Penetration Test.
9. Dynamic Cone Penetration Test.

Books:

1. Soil Testing for Engineers by S.Prakash&P.K.Jain, Nem Chand &Bros.Roorkee.
2. Engineering Soil Testing by Lambi, Wiley-Eastern.
3. Engineering Properties of Soils & Their Measurement by JE Bowles, McGraw-Hill.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	2	3	1	3	1	1	-	-	-	-	-	-	2	2	1
CO2.	2	3	1	3	1	1	-	-	-	-	-	-	2	2	1
CO3.	2	3	1	3	1	1	-	-	-	-	-	-	2	2	1
CO4.	2	3	1	3	1	1	-	-	-	-	-	-	2	2	1
3 –High 2-Medium 1-Low															

SURVEY CAMP

Course code	**EEC/CE/1-P**			
Category	**Employability Enhancement Course**			
Course title	**Survey Camp**			
Scheme and credits	**L**	**P**	**Credits**	
	-	**-**	**4.0**	
Course Assessment Methods	**Course Assessment Methods (Internal: 100)** The assessment is based on the level of participation in Field work, timely submission of reports/maps, the quality of topographical map, the performance in VIVA-VOCE, the quality of report work and ethical practices followed. There will be a Viva voce for course evaluation. The course coordinator will conduct this viva voce for evaluation in the slot assigned to the students as per their timetable at the end of fifth semester. The Chairperson of the Department will notify the week for the internal course evaluations. The external examination will be conducted by a team of internal examiners, preferably the laboratory course coordinator and others, appointed by the Chairperson of the Department. The final internal viva voce examination will be conducted only in groups of 5-10 students. The Course Coordinator/Internal Examiners will maintain and submit the bifurcation of marks obtained by the students in internal evaluation in the Performa (attached herewith as Annexure II and III) to the respective departments in addition to submitting and uploading of overall marks on the university portal as per the requirement of the result branch. The laboratory course coordinator will also conduct laboratory course exit survey and, compute and submit the attainment levels of the laboratory course based on direct and indirect evaluation components and submit it to the Chairperson office along with the internal assessment marks.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Originate the topographical map of any type of terrain.	**L6(Creating)**
CO2.	Identify the field requirements for different construction activities.	**L3(Applying)**
CO3.	Inspect and plan the requirements of the terrain.	**L4(Analyzing)**
CO4.	Recommend the terrain for type of construction work.	**L5(Evaluating)**
CO5.	Estimate the type of terrain: requirement of filling or excavation.	**L5(Evaluating)**
CO6.	Justify the alignment of Highway, railway or canal etc.	**L5(Evaluating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	3	2	3	3	3	1	3	3	3	2	2	1	2	1	2
CO2.	3	1	2	3	1	1	3	1	2	1	2	1	2	1	2
CO3.	3	1	1	1	1	1	1	1	1	1	1	1	2	1	2
CO4.	3	2	2	2	1	2	1	1	1	1	1	1	2	1	2
CO5.	3	3	3	2	2	2	1	1	1	1	1	1	2	1	2
CO6.	3	3	3	3	3	3	2	1	1	1	1	1	2	1	2
3 –High 2-Medium 1-Low															

SEMESTER –VI

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DESIGN OF STEEL STRUCTURES – II

Course code	**PC/CE/13-T**			
Category	**Program Core**			
Course title	**Design of Steel Structures-II**			
Scheme and credits	**L**	**T**	**Credits**	
	3	**-**	**3.0**	
Course Assessment Methods	**Internal Examination (30 marks):** • Three minor tests each of 20 marks including third minor in open book mode will be conducted. The average of the highest marks obtained by a student in the any of the two minor examinations will be considered. • Class Performance will be measured through percentage of lectures attended (04 marks) • Assignments, quiz etc. will have weightage of 06 marks			
	End semester examination (70 marks): • Nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Two questions are to be set from each unit. All questions will carry equal marks. • A candidate is required to attempt 05 questions in all, one compulsory and remaining four questions selecting one from each of the four units.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Analyze the plastic design of steel.	**L4(Analyzing)**
CO2.	Estimate the design parameters for water tank, steel stacks etc.	**L5(Evaluating)**
CO3.	Compare the design analysis of transmission and microwave towers.	**L5(Evaluating)**
CO4.	Make use of Indian standard code for different steel designs.	**L3(Applying)**
CO5.	Design the Industrial buildings and components using purlins and columns.	**L6(Creating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

UNIT-I

Elementary Plastic Analysis and Design: Introduction, Scope of plastic analysis, ultimate load carrying capacity of tension members and compression members, flexural members, shape factor, mechanisms, plastic collapse, analysis, plastic analysis applied to steel beams and simple portal frames and design.

UNIT-II

Design of Water Tanks: Introduction, permissible stresses, design of circular, rectangular and pressed steel tanks including staging.
Design of Steel Stacks: Introduction, various loads to be considered for the design of steel stacks, design of steel stacks including foundation.

UNIT-III

Towers: Transmission line towers, microwave towers, Design loads, classification, design procedure and specification.

Cold Formed Sections: Introduction and brief description of various types of cold formed sections, local buckling, concepts of effective width and effective sections, elements with stiffeners, design of compression and bending elements.

UNIT-IV

Industrial Buildings: Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings and stepped columns.

Books:

1. Design of Steel Structures, A. S. Arya & J. L. Ajmani, Nem Chand & Bros., Roorkee.
2. Design of Steel Structures, P. Dayartnam, Wheeler Pub. Allahabad.
3. IS: 800-1984, Indian Standard Code of Practice for General Construction in Steel.
4. IS-801-1975, Indian Standard Code of Practice for Use of Cold formed light gauge steel structural members in general building construction.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	1	3	1	3	1	1	-	-	-	-	-	-	2	3	1
CO2.	2	1	1	3	1	1	-	-	-	-	-	-	2	3	2
CO3.	2	3	3	1	1	1	-	-	-	-	-	-	2	3	2
CO4.	3	1	1	1	1	1	-	-	-	-	-	-	3	3	2
CO5.	3	2	2	1	1	1	-	-	-	-	-	-	3	3	2
3 –High 2-Medium 1-Low															

DESIGN OF CONCRETE STRUCTURES-I

Course code	**PC/CE/14-T**			
Category	**Program Core**			
Course title	**Design of Concrete Structures-I**			
Scheme and credits	**L**	**T**	**Credits**	
	3	**-**	**3.0**	
Course Assessment Methods	**Internal Examination (30 marks):** • Three minor tests each of 20 marks including third minor in open book mode will be conducted. The average of the highest marks obtained by a student in the any of the two minor examinations will be considered. • Class Performance will be measured through percentage of lectures attended (04 marks) • Assignments, quiz etc. will have weightage of 06 marks			
	End semester examination (70 marks): • Nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Two questions are to be set from each unit. All questions will carry equal marks. • A candidate is required to attempt 05 questions in all, one compulsory and remaining four questions selecting one from each of the four units.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Analyze the properties of cement, soil, aggregates, concrete etc.	**L4(Analyzing)**
CO2.	Estimate the design parameters for beams, columns, foundations etc.	**L5(Evaluating)**
CO3.	Make use of Indian standard code for different concrete designs.	**L3(Applying)**
CO4.	Design the components of roof slabs and retaining walls.	**L6(Creating)**
CO5.	Construct the detailed drawings of reinforcement for concrete elements.	**L6(Creating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

UNIT-I

Elementary treatment of concrete technology: Physical requirements of cement, aggregate, admixture and reinforcement, Strength and durability, shrinkage and creep. Design of concrete mixes, Acceptability criterion, I. S. Specifications,

Design Philosophies in Reinforced Concrete: Working stress and limit state methods, Limit state v/s working stress method, Building code, Normal distribution curve, characteristic strength and characteristics loads, design values, Partial safety factors and factored loads, stress -strain relationship for concrete and steel.

UNIT-II

Working Stress Method: Basic assumptions, permissible stresses in concrete and steel, design of singly and doubly reinforced rectangular and flanged beams in flexure, steel beam theory, inverted flanged beams, design examples.

Limit State Method: Basic assumptions, Analysis and design of singly and doubly reinforced rectangular flanged beams, minimum and maximum reinforcement requirement, design examples.

UNIT-III

Analysis and Design of Sections in shear bond and torsion: Diagonal tension, shear reinforcement, development length, Anchorage and flexural bond, Torsional, stiffness, equivalent shear, Torsional reinforcement, Design examples.

Columns and Footings: Effective length, Minimum eccentricity, short columns under axial compression, Uniaxial and biaxial bending, slender columns, Isolated and wall footings, Design examples.

Serviceability Limit State: Control of deflection, cracking, slenderness and vibrations, deflection and moment relationship for limiting values of span to depth, limit state of crack width, Design examples.

UNIT-IV

One way and Two Ways Slabs: General considerations, Design of one way and two ways slabs for distributed and concentrated loads, Non-rectangular slabs, openings in slabs, Design examples.

Retaining Walls: Classification, Forces on retaining walls, design criteria, stability requirements, Proportioning of cantilever retaining walls, counter-fort retaining walls, criteria for design of counter-forts, design examples.

Concrete Reinforcement and Detailing: Requirements of good detailing cover to reinforcement, spacing of reinforcement, reinforcement splicing, Anchoring reinforcing bars in flexure and shear, curtailment of reinforcement.

Text Books:

1. Reinforced Concrete-Limit State Design, A. K. Jain, Nem Chand & Bros., Roorkee.
2. Reinforced Concrete, I. C. Syal &A. K. Goel, A. H. Wheeler & Co., Delhi.
3. Reinforced Concrete Design, S. N. Sinha, TMH Pub., New Delhi.
4. IS 456: 2000, Plain and Reinforced Concrete –Code of Practice
5. IS 10262-2019, Concrete Mix Proportioning Guidelines.
6. SP-16(S&T)-1980, 'Design Aids for Reinforced Concrete to IS: 456, BIS, New Delhi.
7. SP-34(S&T)-1987 'Handbook on Concrete Reinforcement and Detailing', BIS, New Delhi.
8. Reinforced Cement Concrete Design, by Neelam Sharma, S.K. Kataria & Sons, New Delhi.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	1	3	1	3	1	1	-	-	-	-	-	-	2	3	1
CO2.	2	1	1	3	1	1	-	-	-	-	-	-	2	3	2
CO3.	2	3	3	1	1	1	-	-	-	-	-	-	2	3	2
CO4.	3	1	1	1	1	1	-	-	-	-	-	-	3	3	2
CO5.	3	2	2	1	1	1	-	-	-	-	-	-	3	3	2
3 –High 2-Medium 1-Low															

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DISASTER PREPAREDNESS & PLANNING

Course code	**MC/7-T**			
Category	**Mandatory Course**			
Course title	**Disaster Preparedness & Planning**			
Scheme and credits	**L**	**T**	**Credits**	
	3	**0**	**0.0**	
Course Assessment Methods	**Internal Examination (30 marks):** • Three minor tests each of 20 marks including third minor in open book mode will be conducted. The average of the highest marks obtained by a student in the any of the two minor examinations will be considered. • Class Performance will be measured through percentage of lectures attended (04 marks) • Assignments, quiz etc. will have weightage of 06 marks			
	End semester examination (70 marks): • Nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Two questions are to be set from each unit. All questions will carry equal marks. • A candidate is required to attempt 05 questions in all, one compulsory and remaining four questions selecting one from each of the four units.			

Course outcomes

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
COl	Understand Categories of Disasters	L2(Understanding)
CO2	Realize the responsibilities to society	L3(Applying)
CO3	Analyze relationship between Development and Disasters	L4(Analyzing)
CO4	Apply Disaster Concepts to Management	L5(Creating)

Course Contents

Unit I

Introduction - Concepts and definitions: disaster, hazard, vulnerability, risks- severity, frequency and details, capacity, impact, prevention, mitigation).

Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); man-made disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of lndia, mountain and coastal areas, ecological fragility.

Unit II

Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

Unit III

Disaster Risk Reduction (DRR) - Disaster management cycle - its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response(water, sanitation, food safety, waste management, disease control,

security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

Unit IV

Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land-use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

Books:

1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
2. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
3. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
4. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
5. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	-	-	-	-	1	-	-	-	1
CO2	-	-	-	-	-	-	3	-	2	-	-	1
CO3	-	-	-	1	-	3	3	2	2	-	-	1
CO4	-	-	-	-	-	-	-	-	-	1	3	2
3- HIGH 2-MEDIUM 1-LOW												

CONCRETE TESTING LAB

Course code	**PC/CE/14-P**			
Category	**Program Core**			
Course title	**Concrete Testing Lab**			
Scheme and credits	**L**	**P**	**Credits**	
	-	**2**	**1.0**	
Course Assessment Methods	**Course Assessment Methods (Internal: 50; External: 50)** The internal and external assessment is based on the level of participation in laboratory Sessions, timely submission of experiments/assignments, the quality of solutions designed for the assignments, the performance in VIVA-VOCE, the quality of laboratory file and ethical practices followed. There will be a continuous process for laboratory course evaluation. Two internal examinations (each of 50 marks) for the laboratory courses (Minor Laboratory Evaluations: MLE I and MLE II) will be conducted in the week before or after the internal examinations for the theory courses. The overall internal marks will be calculated as the average of the two minor laboratory course evaluations. The course coordinator will conduct these minor evaluations in the slots assigned to them as per their timetable. The Chairperson of the Department will only notify the week for the internal laboratory course evaluations. The marks for MLE I and MLE II must be submitted within a week of the conduct of these laboratory course evaluations. The external examination will be conducted by external examiner appointed by the Controller of Examination along with the internal examiner, preferably the laboratory course coordinator, appointed by the Chairperson of the Department. The final practical examination of duration three hours will be conducted only in groups of 20-25 students. The Course Coordinator/Internal Examiners/External Examiners will maintain and submit the bifurcation of marks obtained by the students in internal as well as external evaluations in the Performa (attached herewith as Annexure II and III) to the respective departments in addition to submitting and uploading of overall marks on the university portal as per the requirement of the result branch. The laboratory course coordinator will also conduct laboratory course exit survey and, compute and submit the attainment levels of the laboratory course based on direct and indirect evaluation components and submit it to the Chairperson office along with the internal assessment marks.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Analyze the properties of cement, aggregates and concrete.	**L4(Analyzing)**
CO2.	Compare the properties of cement, aggregates and concrete with the recommended standards, respectively.	**L5(Evaluating)**
CO3.	Recommend for the use of cement, aggregates and concrete in different construction activities	**L5(Evaluating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

LIST OF EXPERIMENTS

Tests on Cement

1 Specific gravity of cement using specific gravity bottle.
2 Standard consistency of cement and setting time (initial and final) using Vicat's apparatus.
3 Fineness of cement by Sieve analysis method.
4 Soundness of cement by Le-Chatelier's apparatus.
5 Compressive strength of cement.

Tests on Aggregate

1 Moisture content and bulking of fine aggregate.
2 Fineness modulus of coarse and fine aggregates.

Tests on Concrete

1 Workability of cement concrete by Slump test.
2 Compressive strength of concrete by Cube test.

Books Recommended:

1 Concrete Manual-M. L. Gambhir, Dhanpat Rai & Sons, N. Delhi.
2 Concrete Technology-M. L. Gambhir, Tata McGraw Hill, N. Delhi.

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1.	**3**	**2**	**2**	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**3**
CO2.	**3**	**2**	**2**	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**3**
CO3.	**3**	**2**	**2**	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**3**
3 –High 2-Medium 1-Low															

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ENVIRONMENTAL ENGINEERING – I LAB

Course code	**PC/CE/15-P**			
Category	**Program Core**			
Course title	**Environmental Engineering -I Lab**			
Scheme and credits	**L**	**P**	**Credits**	
	-	**2**	**1.0**	
Course Assessment Methods	**Course Assessment Methods (Internal: 50; External: 50)** The internal and external assessment is based on the level of participation in laboratory Sessions, timely submission of experiments/assignments, the quality of solutions designed for the assignments, the performance in VIVA-VOCE, the quality of laboratory file and ethical practices followed. There will be a continuous process for laboratory course evaluation. Two internal examinations (each of 50 marks) for the laboratory courses (Minor Laboratory Evaluations: MLE I and MLE II) will be conducted in the week before or after the internal examinations for the theory courses. The overall internal marks will be calculated as the average of the two minor laboratory course evaluations. The course coordinator will conduct these minor evaluations in the slots assigned to them as per their timetable. The Chairperson of the Department will only notify the week for the internal laboratory course evaluations. The marks for MLE I and MLE II must be submitted within a week of the conduct of these laboratory course evaluations. The external examination will be conducted by external examiner appointed by the Controller of Examination along with the internal examiner, preferably the laboratory course coordinator, appointed by the Chairperson of the Department. The final practical examination of duration three hours will be conducted only in groups of 20-25 students. The Course Coordinator/Internal Examiners/External Examiners will maintain and submit the bifurcation of marks obtained by the students in internal as well as external evaluations in the Performa (attached herewith as Annexure II and III) to the respective departments in addition to submitting and uploading of overall marks on the university portal as per the requirement of the result branch. The laboratory course coordinator will also conduct laboratory course exit survey and, compute and submit the attainment levels of the laboratory course based on direct and indirect evaluation components and submit it to the Chairperson office along with the internal assessment marks.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Analyze the properties of water and waste water sample.	**L4(Analyzing)**
CO2.	Compare the properties of water and waste water with the recommended standards, respectively.	**L2(Understanding)**
CO3.	Recommend for the use of water in different construction activities	**L5(Evaluating)**
CO4.	Recommend the type of treatment plant required for waste water treatment.	**L5(Evaluating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

LIST OF EXPERIMENTS:

1. To determine the pH value of a given sample of waste water.
2. To determine the turbidity in a given waste water sample.
3. To determine the acidity of given sample of waste water.

4. To determine the alkalinity of given sample of waste water.
5. To determine temporary and permanent hardness in a given water sample.
6. To determine the chlorine does required for a given water sample.
7. To determine total suspended, suspended, dissolved settable solids in a waste water sample.
8. To determine the chloride concentration of given sample of waste water.
9. To determine the sulphate concentration in given water sample.

REFERENCE BOOKS:-

1. Pant M.K., Laboratory Manual for Civil Engineering, S.K. Kataria & Sons, New Delhi.
2. Moondra H.S. and Rajiv Gupta, Laboratory Manual for Civil Engineering, CBS Publishers.

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1.	**3**	**2**	**2**	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**2**
CO2.	**3**	**2**	**2**	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**3**
CO3.	**3**	**2**	**2**	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**3**
CO4.	**3**	**2**	**2**	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**2**
3 –High 2-Medium 1-Low															

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IRRIGATION ENGINEERING (DRAWING)

Course code	**PC/CE/16-P**			
Category	**Program Core**			
Course title	**Irrigation Engineering (Drawing)**			
Scheme and credits	**L**	**P**	**Credits**	
	-	**2**	**1.0**	
Course Assessment Methods	**Course Assessment Methods (Internal: 50; External: 50)** The internal and external assessment is based on the level of participation in laboratory Sessions, timely submission of experiments/assignments, the quality of solutions designed for the assignments, the performance in VIVA-VOCE, the quality of laboratory file and ethical practices followed. There will be a continuous process for laboratory course evaluation. Two internal examinations (each of 50 marks) for the laboratory courses (Minor Laboratory Evaluations: MLE I and MLE II) will be conducted in the week before or after the internal examinations for the theory courses. The overall internal marks will be calculated as the average of the two minor laboratory course evaluations. The course coordinator will conduct these minor evaluations in the slots assigned to them as per their timetable. The Chairperson of the Department will only notify the week for the internal laboratory course evaluations. The marks for MLE I and MLE II must be submitted within a week of the conduct of these laboratory course evaluations. The external examination will be conducted by external examiner appointed by the Controller of Examination along with the internal examiner, preferably the laboratory course coordinator, appointed by the Chairperson of the Department. The final practical examination of duration three hours will be conducted only in groups of 20-25 students. The Course Coordinator/Internal Examiners/External Examiners will maintain and submit the bifurcation of marks obtained by the students in internal as well as external evaluations in the Performa (attached herewith as Annexure II and III) to the respective departments in addition to submitting and uploading of overall marks on the university portal as per the requirement of the result branch. The laboratory course coordinator will also conduct laboratory course exit survey and, compute and submit the attainment levels of the laboratory course based on direct and indirect evaluation components and submit it to the Chairperson office along with the internal assessment marks.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Elaborate the sketches of different diversion head works in Canals.	**L6(Creating)**
CO2.	Illustrate the sketches of different cross drainage works in Canals.	**L2(Understanding)**
CO3.	Outline the problems of seepage in Earth dams on impermeable foundation.	**L2(Understanding)**
CO4.	Elaborate the sketches of different regulation works in Canals.	**L6(Creating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

List of Drawings:-

1 Structural drawings of Weirs.
2 Structural drawings of Barrages.
3 Structural drawings of Guide Banks.
4 Cross-section of different cross drainage works.
5 Structural drawings of Sarda type fall.

6 Structural drawings of Sloping glacis fall.
7 Seepage line in a homogeneous earth dams on impermeable foundation with horizontal drainage.
8 Structural drawings of Ogee Spillway.
9 Structural drawings of Stilling Basin

Note: Emphasis would be given to the computer aided drawings of some of above structures.

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1.	**2**	**1**	**2**	**1**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**2**
CO2.	**2**	**1**	**2**	**1**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**2**
CO3.	**2**	**1**	**2**	**1**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**2**
CO4.	**2**	**1**	**2**	**1**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**2**
3 –High 2-Medium 1-Low															

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CIVIL ENGINEERING MATERIALS TESTING & EVALUATION-II LAB

Course code	**ESC/8-P**			
Category	**Engineering Science Course**			
Course title	**Civil Engineering Materials Testing & Evaluation-II Lab**			
Scheme and credits	**L**	**P**	**Credits**	
	-	**2**	**1.0**	
Course Assessment Methods	**Course Assessment Methods (Internal: 50; External: 50)** The internal and external assessment is based on the level of participation in laboratory Sessions, timely submission of experiments/assignments, the quality of solutions designed for the assignments, the performance in VIVA-VOCE, the quality of laboratory file and ethical practices followed. There will be a continuous process for laboratory course evaluation. Two internal examinations (each of 50 marks) for the laboratory courses (Minor Laboratory Evaluations: MLE I and MLE II) will be conducted in the week before or after the internal examinations for the theory courses. The overall internal marks will be calculated as the average of the two minor laboratory course evaluations. The course coordinator will conduct these minor evaluations in the slots assigned to them as per their timetable. The Chairperson of the Department will only notify the week for the internal laboratory course evaluations. The marks for MLE I and MLE II must be submitted within a week of the conduct of these laboratory course evaluations. The external examination will be conducted by external examiner appointed by the Controller of Examination along with the internal examiner, preferably the laboratory course coordinator, appointed by the Chairperson of the Department. The final practical examination of duration three hours will be conducted only in groups of 20-25 students. The Course Coordinator/Internal Examiners/External Examiners will maintain and submit the bifurcation of marks obtained by the students in internal as well as external evaluations in the Performa (attached herewith as Annexure II and III) to the respective departments in addition to submitting and uploading of overall marks on the university portal as per the requirement of the result branch. The laboratory course coordinator will also conduct laboratory course exit survey and, compute and submit the attainment levels of the laboratory course based on direct and indirect evaluation components and submit it to the Chairperson office along with the internal assessment marks.			

Course outcomes:

Sr. No.	Course outcomes At the end of the course students will be able to:	RBT* Level
CO1.	Inspect the type of bricks at different sites.	**L4(Analyzing)**
CO2.	Compare the quality of bricks, tiles, pavers etc.	**L4(Analyzing)**
CO3.	Deduct the different properties of bricks, tiles, pavers under different conditions.	**L5(Evaluating)**
CO4.	Determine the strength of already existing concrete structure.	**L5(Evaluating)**

***Revised Bloom's Taxonomy Action verbs/Levels**

LIST OF EXPERIMENTS:

Tests on Bricks:

1. Water absorption test.
2. Crushing or Compressive strength test

3. Hardness, Shape & Size and Efflorescence tests

Tests on Tiles:

4. Compressive Strength test.
5. Water absorption test.
6. Hardness, Shape & Size and Efflorescence tests.

Tests on Interlocking Pavers:

7. Compressive Strength test.

Non-destructive Testing of Concrete:

8. Rebound Hammer

Reference Books:

1. IS-3495: Methods of Test of burnt clay building.
2. IS-15658: Concrete Paving Block Specifications.
3. Civil Engineering Materials and Testing, by Kaushal Kishore, Standard Publishers Distributors.
4. Laboratory Manual for Civil Engineering students by M.K. Pant, S.K. Kataria & Sons, Daryaganj, New Delhi

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	2	3	1	3	1	1	-	-	-	-	-	-	2	1	3
CO2.	2	3	1	3	1	1	-	-	-	-	-	-	2	1	3
CO3.	2	3	1	3	1	1	-	-	-	-	-	-	2	1	3
CO4.	2	3	1	3	1	1	-	-	-	-	-	-	2	1	3
3 –High 2-Medium 1-Low															