

Scheme of Examination & Syllabus 2010

Civil Engineering



2013-14

YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING

Hingna Road, Wanadongri, Nagpur – 441 110.
Maharashtra State

YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING

B.E. (Civil Engineering)
SCHEME OF EXAMINATION 2010-11



Sl. No.	Sub Code	Subject	Contact Hours				Credits	% Weightage				ESE Duration Hrs.
			L	T	P	Total Contact Hours		MSE-I	MSE-II	TA	ESE	

III SEMESTER

1	GE201	Engineering Mathematics - III	3	1	0	4	4	15	15	10	60	3
2	GE202	Engineering Geology	4	0	0	4	4	15	15	10	60	3
3	GE203	Engineering Geology	0	0	2	2	1			40	60	
4	CV201	Strength of Materials	3	1	0	4	4	15	15	10	60	3
5	CV202	Strength of Materials	0	0	2	2	1			40	60	
6	CV203	Geotechnical Engineering -I	3	1	0	4	4	15	15	10	60	3
7	CV204	Geotechnical Engineering -I	0	0	2	2	1			40	60	
8	CV205	Fluid Mechanics -I	3	1	0	4	4	15	15	10	60	3
9	CV206	Fluid Mechanics -I	0	0	2	2	1			40	60	
Total			16	4	8	28	24					

IV SEMESTER

1	GE204	Numerical Methods and Statistical Techniques	3	1	0	4	4	15	15	10	60	3
2	CV208	Concrete Technology	4	0	0	4	4	15	15	10	60	3
3	CV209	Concrete Technology	0	0	2	2	1			40	60	
4	CV210	Surveying -I	3	1	0	4	4	15	15	10	60	3
5	CV211	Surveying -I	0	0	2	2	1			40	60	
6	CV212	Environmental Engineering-I	3	1	0	4	4	15	15	10	60	3
7	CV213	Environmental Engineering-I	0	0	2	2	1			40	60	
9	CV214	Building Construction and Building Drawing	4	0	0	4	4	15	15	10	60	4
10	CV215	Computer aided Building Drawing	0	0	2	2	1			40	60	
Total			17	3	8	28	24					

Chairperson		Date of Release	May 2012	Applicable for AY 2012-13 Onwards
Dean (Acad. Matt.)		Version	1.02	

YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING

B.E. (Civil Engineering)
SCHEME OF EXAMINATION 2010-11

Sl. No.	Sub Code	Subject	Contact Hours				Credits	% Weightage				ESE Duration Hrs.
			L	T	P	Total Contact Hours		MSE-I	MSE-II	TA	ESE	

V SEMESTER

1	GE301	Data collection & Report writing	2	0	0	2	2	15	15	10	60	2
2	CV301	Surveying -II	4	0	0	4	4	15	15	10	60	3
3	CV302	Surveying -II Lab	0	0	2	2	1			40	60	
4	CV303	Reinforced Concrete Structures	3	1	0	4	4	15	15	10	60	4
5	CV304	Transportation Engineering -I	4	0	0	4	4	15	15	10	60	3
6	CV305	Transportation Engineering -I	0	0	2	2	1			40	60	
7	CV306	Environmental Engineering-II	4	0	0	4	4	15	15	10	60	3
8	CV307	Structural Analysis-I	3	1	0	4	4	15	15	10	60	3
9	CV308	Structural Analysis-I	0	0	2	2	1			40	60	
10	CV309	Site Visit and Seminar	0	0	0	2	1			100		30 - 40 min
Total			20	2	8	30	26					

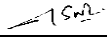

VI SEMESTER

1	GE302	Project Planning & Management	3	0	0	3	3	15	15	10	60	3
2	CV310	Fluid Mechanics -II	3	1	0	4	4	15	15	10	60	3
3	CV311	Fluid Mechanics -II	0	0	2	2	1			40	60	
4	CV312	Engineering Hydrology	3	1	0	4	4	15	15	10	60	3
5		Professional Elective I	4	0	0	4	4	15	15	10	60	3
6		Professional Elective II	4	0	0	4	4	15	15	10	60	3
7		Free Elective I	4	0	0	4	4	15	15	10	60	3
8		Free Elective I	0	0	2	2	1			40	60	
9	CV313	Computer Laboratory	0	0	2	2	1			40	60	
10	CV314	Seminar	0	0	2	2	1			100		
Total			21	2	8	31	27					

CV315	PE I : Water Treatment	4	0	0	4	4	15	15	10	60
CV316	PE I : Prestressed Concrete	4	0	0	4	4	15	15	10	60
CV317	PE I : Building Services	4	0	0	4	4	15	15	10	60

CV320	PE II : New Engineering Materials	4	0	0	4	4	15	15	10	60
CV321	PE II : Advanced RCC	4	0	0	4	4	15	15	10	60
CV322	PE II : Water Power Engineering	4	0	0	4	4	15	15	10	60
CV323	PE II : Pavement Design	4	0	0	4	4	15	15	10	60

CV325	FE I : Environmental Management	4	0	0	4	4	15	15	10	60
CV326	FE I : Environmental Management	0	0	2	2	1			40	60
CV327	FE I : Building Services Engineering	4	0	0	4	4	15	15	10	60
CV328	FE I : Building Services Engineering	0	0	2	2	1			40	60
CV329	FE I : Construction Techniques in Engineering	4	0	0	4	4	15	15	10	60
CV330	FE I : Lab. Construction Techniques in Engineering	0	0	2	2	1			40	60

Chairperson		Date of Release	Oct 2015	Applicable for AY 2015-16 Onwards
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YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING

B.E. (Civil Engineering) SCHEME OF EXAMINATION 2010-11

Sl. No.	Sub Code	Subject	Contact Hours				Credits	% Weightage				ESE Duration Hrs.
			L	T	P	Total Contact Hours		MSE-I	MSE-II	TA	ESE	

VII SEMESTER

1	CV401	Water Resource Engineering	4	0	0	4	4	15	15	10	60	3
2	CV402	Structural Analysis-II	3	1	0	4	4	15	15	10	60	3
3	CV403	Structural Analysis-II	0	0	2	2	1			40	60	
4	CV404	Geotechnical Engineering II	3	1	0	4	4	15	15	10	60	3
5		Professional Elective III	4	0	0	4	4	15	15	10	60	3
6		Free Elective II	4	0	0	4	4	15	15	10	60	3
7	CV405	Steel Structures	3	1	0	4	4	15	15	10	60	4
8	CV406	Training	0	0	0	0	3			100		
9	CV407	Project- Phase I	0	0	4	4	4			40	60	
Total			21	3	6	30	32					

CV410	PE III : Traffic Engineering	4	0	0	4	4	15	15	10	60
CV411	PE III : Advanced Hydraulics	4	0	0	4	4	15	15	10	60
CV412	PE III : Structural Optimization	4	0	0	4	4	15	15	10	60
CV413	PE III : Natural Resources Management	4	0	0	4	4	15	15	10	60



GE415	FE2: Probability Theory & statistical Inference	4	0	0	4	4	15	15	10	60	100
EL412	FE2:Electrical Energy Audit and Safety	4	0	0		4	15	15	10	60	
EL413	FE2:Utilisation of Electrical Energy	4	0	0		4	15	15	10	60	
ET411	FE2 : Soft Computing	4	0	0	4	4	15	15	10	60	3 Hrs
ET412	FE2 : Industrial Instrumentation	4	0	0	4	4	15	15	10	60	3 Hrs
ME429	FE 2 : Total Quality Management	4	0	0	4	4	15	15	10	60	
ME430	FE 2 : Reliability Engineering	4	0	0	4	4	15	15	10	60	
EE411	FE 2 :Fuzzy Logic & Neural Network	4	0	0	4	4	15	15	10	60	
EE429	FE 2 :Basic of Analog and Digital Communication Systems	4	0	0	4	4	15	15	10	60	
CT411	FE2:Multimedia and Animation	4	0	0	4	4	15	15	10	60	100
CT412	FE2:Current Trends and Technologies	4	0	0	4	4	15	15	10	60	100
IT408	FE2: Applications of Computer Networking	4	0	0	4	4	15	15	10	60	3 Hrs

VIII SEMESTER

1	CV421	Estimating & Costing	3	1	0	4	4	15	15	10	60	4
2	CV422	Transportation Engineering -II	4	0	0	4	4	15	15	10	60	3
3		Professional Elective IV	4	0	0	4	4	15	15	10	60	3
4		Professional Elective V	4	0	0	4	4	15	15	10	60	3
5	CV424	Comprehensive Viva voce	0	0	0	0	3			40	60	
6	CV425	Project- Phase II	0	0	6	6	6			40	60	
7	CV426	Extra/Co-curricular / Competitive Examination	0	0	0	0	2			100		
Total			15	1	6	22	27					

CV427	PE IV : Waste Water Treatment	4	0	0	4	4	15	15	10	60
CV428	PE IV : Earthquake Engineering	4	0	0	4	4	15	15	10	60
CV429	PE IV : Matrix Analysis of Structures	4	0	0	4	4	15	15	10	60

CV432	PE V : Water Transmission and Distribution Systems	4	0	0	4	4	15	15	10	60
CV433	PE V : Advanced Steel Design	4	0	0	4	4	15	15	10	60
CV434	PE V : Maintenance and Rehabilitation Engineering	4	0	0	4	4	15	15	10	60

Chairperson		Date of Release	Jul 2014	Applicable for AY 2014-15 Onwards
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**Syllabus Of B.E.VII Semester Civil Engineering**

CV 401 / CV 602	WATER RESOURCES ENGINEERING			L=4	T=0	P=0	CREDITS = 4
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration	
	15	15	10	60	100	3 Hrs	

COURSE OBJECTIVES	COURSE OUTCOMES
1. To know the importance, location, components and types of irrigation structures. 2. To learn the procedure to design the irrigation structures. 3. To get hand on experience in drawing of irrigation structures.	1. An ability to understand water requirement for various crop pattern. 2. An ability to understand parameters and procedures adopted in reservoir planning 3. An ability to understand the design of water conveyance system like canal 4. An ability to understand the analysis and design of various water retaining structures like weirs and dams .
Mapped Program Outcomes: a,c,e,f,g,h,i,j,k	

UNIT -1:

General: Irrigation, necessity, importance, benefits and ill effects of irrigation, types, methods of water distribution to the field

Water requirement of crops : Crop seasons and major crops in India, crop rotation, suitability of soils for irrigation, standards of irrigation water, field capacity, wilting point, available moisture in soils for crops / plants, depth & frequency of irrigation, GCA, CCA, kor period, kor water depth, duty – delta relation, base period, outlet factor, PET-R method of crop water requirements.

[09 Hrs.]

UNIT -2:

Reservoir Planning: Selection of site for reservoirs, engineering surveys, geological and hydrological investigations, fixing of LWL, FTL/FRL, HFL, TBL, different storage zones in reservoirs, determination of storage capacity by mass curve method, reservoir sedimentation and its removal, life estimation of reservoir by Bruner method

[08 Hrs.]

UNIT -3:

Canal Irrigation: types of irrigation canals, canal network, irrigation canals (cross section, longitudinal section and alignment), balancing depth, losses in canals

Canals In Alluvial Soils: Kennedy's silt theory – Design procedure, silt supporting capacity, drawbacks, Lacey's silt theory – definition of initial final and permanent regime channels, Lacey's Regime equations, channel design procedure, limitations

Lined Canals: design procedure, types of lining, relative merits and demerits of canal lining, economics of canal lining.

[08 Hrs.]

UNIT -4:

Diversion Head Works: Component parts of diversion headworks – fish ladder, divide wall, silt excluder and silt ejector, causes of failure of weirs on permeable foundation, Bligh's creep theory, Khosla's theory for design of weirs on permeable foundations

[09 Hrs.]

UNIT -5:

Introduction to Dams: Classification of dams, factors governing selection of type of dams

Gravity Dam: Definition; forces acting on gravity dam, stability requirements, theoretical & practical profile of gravity dam, low & high dam, galleries.

[09 Hrs.]

UNIT -6:

Earthen Dams: Types of earthen dams, failure of earthen dams, criteria for safety and design of earthen dam, seepage analysis, seepage control through embankment and foundation, stability analysis of slopes by Swedish slip circle method, Spillways: Types of spillway only.

[09 Hrs.]

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
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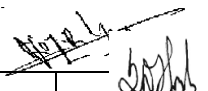
BE SoE and Syllabus 2010-11
Civil Engineering

CV 401 / CV 602	WATER RESOURCES ENGINEERING	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Text books:				
SN	Title	Edition	Authors	Publications
1	Irrigation Engineering and Hydraulic Structures	6 TH Revised Edition (1996)	S.R. Sahastrabudhe	S.K. Kataria Publications New Delhi
2	Irrigation and Water Resources Engineering	(2005)	G.L.Asawa	New Age International Publishers, New Delhi.
3	Irrigation Engineering and Hydraulic Structures	13 TH Revised Edition (1998)	Santosh Kumar Garg	Khanna Publisher New Delhi.
4	Irrigation Engineering and Water power Engineering	12 TH Revised Edition (1993)	B.C.Punmia	Laxmi Publications New Delhi

Reference books:				
SN	Title	Edition	Authors	Publications
1	Theory and Design of Irrigation Structures Vol – II	4 TH Edition (1979)	R.S. Varshney, S.C.Gupta, R.L.Gupta	Nem Chand & Bros. Publications Roorkee
2	Irrigation Engineering	(1999)	N.N. Basak	TataMcGraw-Hill Publications New Delhi
3	Principles and Practice of Irrigation Engineering	2 ND Edition (1988)	S.K. Sharma	S.Chand Publications New Delhi

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**BE SoE and Syllabus 2010-11
Civil Engineering**

CV 402 / CV 705	STRUCTURAL ANALYSIS - II	L=3	T=1	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1. To study basic concept of Degree of Freedoms. 2. To analyze the structural element by Flexibility & Stiffness Method, 3. To study various approximate methods of structural analysis.	1. An ability to understand the effect of forces on structures 2. An ability to understand the formulation of elemental / local stiffness matrix and global stiffness matrix 3. An ability to analyze the Indeterminate structures by choosing appropriate method
Mapped Program Outcomes: a, b,e,i,k,m	

UNIT-1

Introduction to stiffness method, basic terminology, degree of freedom, basic concept of direct stiffness method, derivation of all stiffness coefficients, formulation of compatibility equations, rotation transformation matrix

[06Hrs]

UNIT-2:

Analysis of Plane Truss by stiffness method, solution to problem with maximum three degree of freedom.

[07 Hrs]

UNIT-3:

Analysis of beam without axial deformation by stiffness method, solution to problem with maximum three degree of freedom.

[06 Hrs]

UNIT-4:

Introduction to Flexibility Method of structural analysis, influence coefficient, choice of base determinate structure and redundant forces, compatibility equations, hand solution of simple beam and truss problems

[07Hrs]

UNIT-5:

Moment distribution applied to frames with sway (up to two storey two bay)

[07Hrs]

UNIT-6

Approximate method of structural analysis for multi – storied frames with lateral loads (Portal and Cantilever method), approximate methods for vertical loads i.e. substitute frame method etc. (Maximum three bay three storey)

[06 Hrs]

Text books:				
SN	Title	Edition	Authors	Publications
1	Structural Analysis (volume II)	2nd Edition (2011)	Bhavikatti S.S.	Vikas publishing House LTD, Delhi
2	Basic structural Analysis,	8 th Edition	Reddy C.S;	Tata McGraw Hill Publication, New Delhi
3	Matrix Method of Structural Analysis,	1st Edition (2003)	Meghre A.S. &Deshmukh S.K. ;	Charotar publishing house, Anand
4	Matrix Method of Structural Analysis	(2004)	Gere and Weaver	CBS Publication

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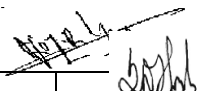
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BE SoE and Syllabus 2010-11
Civil Engineering

CV 402 / CV 705	STRUCTURAL ANALYSIS - II	L=3	T=1	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Reference books:				
SN	Title	Edition	Authors	Publications
1	Intermediate Structural Analysis,	2010	Wang C K,	Tata McGraw Hill Publication, New Delhi
2	Theory of Structure,	2nd	Timoshenko S.P. and D.H. Young;	Tata McGraw Hill Publication, New Delhi
3	Theory of Elasticity	3 rd (1985)	Timoshenko S.P. and J.N. Goodier	Tata McGraw Hill Publication, New Delhi
4	Computational Structural Mechanics	2004	S. Rajasekaran, G. Sankarasubramanian	PHI Learning Pvt. Ltd
5	Structural Analysis: A Matrix Approach	2001	Pandit Gupta	Tata McGraw-Hill Education

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Civil Engineering

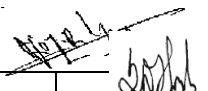
CV 403 / CE 706	STRUCTURAL ANALYSIS – II	L=0	T=0	P=2	CREDITS = 1
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
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COURSE OBJECTIVES	COURSE OUTCOMES
<ol style="list-style-type: none">1. To study basic concepts of Degree of Freedoms.2. To analyze the structural element by Stiffness method.3. To study various approximate methods of structural analysis.	<ol style="list-style-type: none">1. An ability to analyze various structures manually by using stiffness method.2. An ability to analyze various structures using software and compare the results with manual analysis..3. An ability to analyze the indeterminate structures by using appropriate approximate method.
Mapped Program Outcomes: a, e,i,k	

Analysis of Structures Using Standard Software Packages.

- 1) Analysis of a continuous beam without sinking of support by neglecting axial deformation with 3 degree of freedom.
- 2) Analysis of a continuous beam with sinking of support by neglecting axial deformation with 3 degree of freedom.
- 3) Analysis of a plane truss with 3 degree of freedom
- 4) Analysis of a plane truss with inclined roller support with 3 degree of freedom
- 5) Analysis of a plane truss with temperature effect and lack of fit with 3 degree of freedom
- 6) Analysis of a frame (neglecting axial deformation) by Stiffness Method (Hand Calculations)
- 7) Analysis of a multi storied Frame by cantilever method (Hand Calculations)
- 8) Analysis of a multi storied Frame by Substitute Frame Method (Hand Calculations).

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BE SoE and Syllabus 2010-11
Civil Engineering

CV404 / CV 603	GEOTECHNICAL ENGINEERING – II	L=3	T=1	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1. Provide the students with a basic understanding of the essential steps involved in a geotechnical site investigation 2. Introduce to the students, the types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution 3. Familiarize the student with the procedures used for : a) bearing capacity estimation, b) end bearing capacity of pile, c) skin friction	1. An ability to understand the fundamentals of earth pressure 2. An ability to understand stability of slopes and ground improvement techniques 3. An ability to understand different types of foundations 4. An ability to understand different soil exploration techniques.
Mapped Program Outcomes: a,b,c,d,e,f,k	

UNIT-1:

LATERAL EARTH PRESSURE : Fundamentals of earth pressure at-rest, active & passive pressures, general & local states of plastic equilibrium in soil, Rankine's and Coulomb's theories of earth pressure, effects of soil type, surcharge, submergence, graphical solutions of Rebhan and Culmann for active case.

[06 hrs.]

UNIT-2:

STABILITY OF SLOPES : Causes and types of slope failure, stability analysis of infinite slopes and finite slopes, effect of seepage, location of critical slip circle, method of slices for cohesive and C - ϕ soil slopes, pore pressure considerations, Taylor's stability numbers & stability charts, methods of improving stability of slopes

[06 hrs.]

UNIT-3

GROUND IMPROVEMENT : Method of soil stabilization – mechanical stabilization & chemical stabilization, use of admixtures (lime, cement, flyash) in stabilization, basic concepts of reinforced earth - use of geosynthetic materials-salient features, function and applications of various geosynthetic materials, deep compaction by impact, vibroflotation, pre-consolidation techniques by band drain installation, pre-loading and surcharging.

[07 hrs.]

UNIT-4:

SHALLOW FOUNDATIONS:

Bearing capacity of soils (IS: 6403), types of shear failure in foundation soil, Terzaghi's theory, its validity and limitations, bearing capacity factors, effect of water table on bearing capacity, effect of water table on bearing capacity, correction factors for shape and depth of footings, Standard Penetration Test, corrections to N – values & correlation for obtaining design soil parameters, bearing capacity estimation from N-values.

Settlement Analysis of footings and Rafts: Causes of settlement, computation of elastic and consolidation settlement (IS-8009: Part I), differential settlement, control of excessive settlement, proportioning the footing for equal settlement, plate load test: procedure, interpretation for bearing capacity and settlement prediction

[07 hrs.]

UNIT-5

PILE FOUNDATION: Classification and types of piles, constructional features of cast-in-situ & pre-cast concrete piles, pile driving methods, effect of pile driving on ground, load transfer mechanism of axially loaded piles. Pile capacity by Static formula & Dynamic formula, pile load test and interpretation of data, group action in piles, spacing of piles in groups, group efficiency, overlapping of stresses, settlement of pile group by simple approach, negative skin friction and its effect on pile capacity, general feature of under reamed piles, Introduction to well foundations, caissons and coffer dams

[07 hrs.]

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	



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YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING

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BE SoE and Syllabus 2010-11
Civil Engineering

CV404 / CV 603	GEOTECHNICAL ENGINEERING – II	L=3	T=1	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

UNIT-6:

GEOTECHNICAL EXPLORATION : Importance and objectives of field exploration, principal methods of subsurface exploration, open pits & shafts, types of boring, number, spacing and depth of boring for different structures, type of soil samples & samplers, collection & shipment of samples, bore logs and sampling record, One compulsory site visit for 1. Plate load test. 2. Standard Penetration Test

[06 hrs.]

Text books:				
SN	Title	Edition	Authors	Publications
1	Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering	2003	VNS Murthy	CRC Press
2	Soil Mechanics & Foundation Engineering	7 th Edition 2009	Arora K.R.	Standard Publisher Distributors
3	Soil Mechanics & Foundations	16 th Edition 2009	Punmia B. C.	Standard Book House, New Delhi

Reference books:				
SN	Title	Edition	Authors	Publications
1	Design Aids in Soil Mechanics and Foundation Engineering	1988	Kaniraj R.	McGraw Hills, New Delhi
2	Analysis and Design of Foundations and Retaining Structures	1979	ShamsherPrakash, GopoolRanjan and Swami Sharan	SaritaPrakashan, Meeru t.
3	Theory and Practice of Foundation Design	2004	Som N.N. & Das S.C	Prentice Hall & Co., New Delhi
4	IS-8009: Part I (1976). Reaffirmed 1993. Code of practice for calculation of settlement of foundation subjected to symmetrical vertical loads. Part I- Shallow Foundations	1993	-----	Bureau of Indian Standards

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Civil Engineering

CV 410 / CV 805	PE (3) TRAFFIC ENGINEERING	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1.To understand the calculations of spot speed, journey time & running time, methods of OD survey. 2.To understand the different statistical methods such as Binomial, Normal Poisson, Chisquare to know the probabilities at various levels. 3.To study the analysis and designs of rotary intersections 4.To study different traffic signs, methods of design of traffic signal, queing Theory. 5.To study causes and remedial measures of accidents, analysis of accident data. 6.To study the methods and design of parking. To understand the concept of urban transportation problems and principles of urban transport planning.	1. An ability to calculate the spot speed, journey and running time and develop economical trip distribution model 2. An ability to understand the different statistical methods which can be used in various analysis of traffic studies 3. An ability to design rotary intersection in field. 4. An ability to workout the design of signals at various intersections considering practical problems 5. An ability to reduce the accident rate by analyzing the accident data 6. An ability to design the on and off street parking for different situations and understood and used to solve urban transportation problem.
Mapped Program Outcomes: a,b,c,,e,f,h,i,j	

UNIT-1:

General: Road, road user & road vehicle characteristics, traffic on Indian roads.

Traffic Surveys: speed, journey time and delay studies, methods of measurement of spot speed, headways gaps, measurements of running and journey speeds, origin and destination surveys, survey methods, sample size, data analysis & presentation, highway capacity, level of service

[9 Hrs]

UNIT-2:

Traffic Events: Statistical method for interpretation, regression, application of binomial normal and Poisson's distributions, discrete and continuous distribution of traffic flow, test of significance—Chi-square & 'T' test

[8 Hrs]

UNIT-3

Road geometry: Hierarchy of urban roads and their standards, diverging, merging, crossing, weaving, maneuver's and conflict points, types of road junction, channelization of traffic flow, traffic rotary design, grade separated intersections, drive ways

[9 Hrs]

UNIT-4:

Traffic controlling devices: Traffic signs, road markings, traffic signals, design of signalized intersections & signaling systems, Queing theory

[8 Hrs]

UNIT-5

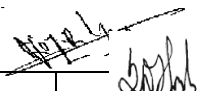
Traffic Safety: Driver's error, vehicle & road surface laws and enforcement, traffic accident conditions in India, collection and interpretation of accident data and recording in standard Format, skidding, speed and weather effects on accidents, analysis of accidents, pedestrian, cyclist & auto vehicle driver's safety, traffic regulation, 3E's of traffic management

[9 Hrs]

UNIT-6:

Parking: Parking surveys, on and off-street parking & parking systems, parking demand, design of off-street parking lot, underground & multistoried parking, introduction to urban traffic.

[8 Hrs]

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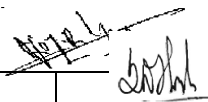
BE SoE and Syllabus 2010-11
Civil Engineering

CV 410 / CV 805	PE (3) TRAFFIC ENGINEERING	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Text books:				
SN	Title	Edition	Authors	Publications
1	Highway Engineering :	1991	Khanna S.K. and Justo C.E.G.	Nem Chand & Bros.
2	Traffic engineering and transportation planning	1987	Kadiyali	Khanna Publications

Reference books:				
SN	Title	Edition	Authors	Publications
1	Highway Engineering	2011	Rangawala B.S.	Charotar Publishing Hous
2	IRC Handbook and MOST Specifications	2012	Indian Road Congress	Indian Road Congress

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CV411 / CV 806	PE (3) ADVANCED HYDRAULICS	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<p>The students will learn the:-</p> <ol style="list-style-type: none"> 1) Concept of uniform flow and critical flow in open channels. 2) Concept of gradually varied flow profile in open channels. 3) Computation of length of gradually varied flow by various method 4) The concept of rigid water column theory and time of flow establishment. 5) The Concept of elastic water column theory and water hammer in pipe. 6) The importance of surge tanks in pipe systems. 	<ol style="list-style-type: none"> 1. An ability to understand the concept of uniform flow and critical flow in open channels 2. An ability to understand the concept of gradually varied flow profile in open channels 3. An ability to understand the computation of length of gradually varied flow by various method 4. An ability to understand the concept of rigid water column theory and time of flow establishment 5. An ability to understand the concept of elastic water column theory and water hammer in pipe. 6. An ability to understand the importance of surge tanks in pipe systems..
Mapped Program Outcomes: a, e, h	

UNIT-1:

Uniform flow, Critical flow, wide rectangular channel, conveyance of channel, section factor, Hydraulic exponent M & N, Channel transitions for subcritical and supercritical flow: hump in channel, reduction in channel width.

[08 hrs.]

UNIT-2:

Gradually varied flow, channel slope, back water curve, dropdown curve, Dynamic equation of GVF in terms of normal depth & critical depth, conveyance K & section factor Z, hydraulic exponent M & N, characteristic of GVF profiles, composite GVF profiles, Various gradually varied flow profiles in channel.

[09 hrs.]

UNIT-3

Computation of gradually varied flow length in channel, direct step method, Bresse's method, Chow's method, introduction to standard step method.

[09 hrs.]

UNIT-4:

Unsteady flow in a pipe, Bernoulli's Equation of unsteady flow in a pipeline for incompressible fluid flow, Time flow establishment, rigid water column theory of water hammer, computation of water hammer pressures

[08 hrs.]

UNIT-5

Elastic water column theory, Bernoulli's equation of motion when compressibility of fluid and elasticity of pipe is considered, continuity equation, Computation of water hammer pressure, Allievis theory for water hammer pressure.

[09 hrs.]

UNIT-6:

Surge tank and its types, location, operation, function, equations governing the flow in simple surge tank system, hydraulic stability of surge tank, Thomas criteria for stability of simple surge tank, computation of maximum upsurges in a simple surge tank by neglecting friction, study of problem of hydraulic stability in a simple surge tank system.

[09 hrs.]

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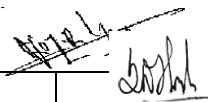
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Civil Engineering

CV411 / CV 806	PE (3) ADVANCED HYDRAULICS	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Text books:				
SN	Title	Edition	Authors	Publications
1	Open channel hydraulics	International Student Edition. (1959)	VenTe Chow	McGraw Hill,
2	Engineering Fluid Mechanics Vol. II	Edition (1981)	Narasimhan S.;	Orient Longman Publication.

Reference books:				
SN	Title	Edition	Authors	Publications
1	Flow through open channels	1998	RangaRaju K.G.	Tata McGraw Hill,
2	Flow in open channels	3rd (1999) Vol 19 No. 2 2009	Subramanya K.	Tata McGraw Hill.
3	U.S.B.R. Earthen Dams	1998	U.S. Department of the interior Bureau of reclamation	United States Government Printing Office

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CV412 / CV 717	PE (3) STRUCTURAL OPTIMIZATION	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1) To understand the need and origin of the optimization methods. 2) To understand various applications of optimization methods used in engineering. 3) To understand an optimization problem and its various components. 4) To understand formulation of optimization problems.	1) Optimization is obtaining the best result under given circumstances. 2) In design, construction and maintenance of any engineering system, engineers have to take many technological and managerial decisions at several stages. 3) Ultimate goal to minimize the effort required and to maximize the desired benefit. 4) Introduction and learning the different optimization methods for solving different types of problems. 5) Optimization problem formulation, linear programming, non linear programming along with application in Civil Engineering.

Mapped Program Outcomes: a,b,c,d,e

UNIT-1:

Introduction and Basic Concepts

Historical development, engineering applications of optimization, art of modeling, objective function, constraints and constraint surface, mathematical formulation for optimization, classification of optimization problems based on nature of constraints, structure of the problem, deterministic nature of variables

[09 hrs]

UNIT-2:

Optimization using Calculus

Stationary points - maxima, minima and saddle points, functions of single and two variables, global optimum; convexity and concavity of functions of one and two variables, optimization of function of one variable and multiple variables, gradient vectors, optimization of function of multiple variables subject to equality constraints, Lagrangian function, optimization of function of multiple variables subject to equality constraints, Hessian matrix formulation, eigen values, Kuhn-Tucker Conditions, examples.

[08 hrs]

UNIT-3

Linear Programming I

Standard form of linear programming (LP) problem, canonical form of LP problem, assumptions in LP models, elementary operations, motivation of simplex method, simplex algorithm and construction of simplex tableau, simplex criterion, minimization versus maximization problems

[09 hrs]

UNIT-4:

Linear Programming II

Revised simplex method, duality in LP, primal-dual relations, dual simplex method, sensitivity or post optimality analysis, other algorithms for solving LP problems – Karmarkar's projective scaling method.

[08 hrs]

UNIT-5

Linear Programming Applications

Solving linear optimization problems using graphical and simplex methods, examples for transportation, water resources, structural and other optimization problems

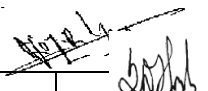
[08 hrs]

UNIT-6:

Non-linear programming

One dimensional methods – elimination methods, unrestricted search, exhaustive search, Fibonacci method, golden section method, introduction to other methods

[08 hrs]

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CV412 / CV 717	PE (3) STRUCTURAL OPTIMIZATION	L=4	T=0	P=0	CREDITS = 4
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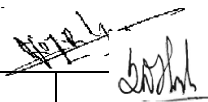
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Text books:

SN	Title	Edition	Authors	Publications
1	Engineering optimization: theory and practice	4th Edition 2009	Rao S.S	New Age International (P) Ltd., New Delhi
2	Introduction to Optimum Design	2004	Arora J.S.	McGraw Hill
3	Optimization for Engineering Design of Algorithms and Examples	2nd Edition 2008	Deb, K.	Prentice-Hall of India Pvt. Ltd., New Delhi
4	Structural optimization using sequential linear programming	1st Edition 2003	Bhavikatti S.S.	Vikas publishing house, New Delhi

Reference books:

SN	Title	Edition	Authors	Publications
1	Principles of Operation Research	4th Edition 1999	Fox R. L.	Prentice Hall of India
2	Principles of Operation Research	2nd Edition 2008	Wagner H.M.,	Prentice Hall of India
3	Linear And Nonlinear Programming	2nd Edition 2011	Stephen G. And ArielaSofer Nash	McGraw Hill Book.Co.

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Civil Engineering

CV418 / CV810	FE (2) ELEMENTS OF EARTHQUAKE ENGINEERING	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1) To understand basic concepts of earthquake 2) To understand damages due to earthquake 3) To understand behavior of structures under earthquake loading 4) To understand disaster management and retrofitting	1. An ability to understand the the necessity and importance of earthquake engineering 2. An ability to understand the provision of IS code used for earthquake resistance design of structure 3. An ability to understand provision for earthquake resistance design of structures as per Indian standard 4. An ability to study of damages caused due to past earthquake in & outside India and remedial measures

Mapped Program Outcomes: a,d,h,i,k

UNIT-1:

Introduction to earthquakes:

Geology of earth, configuration of tectonic plates in a globe, behavior of plates, their motion and effects, causes of earthquake and their characteristics, Earthquake parameters, magnitudes, intensity, Seismic waves
[06 hrs.]

UNIT-2:

Analysis and interpretation of earthquake data, determination of magnitude, location of epicenter, focal depth
[06 hrs.]

UNIT-3

Recording earthquakes, seismicity of the world, history of earthquakes in India and abroad, case studies of effects of earthquakes, causes and sources of earthquake damage
[08 hrs.]

UNIT-4:

Non-engineered earthquake resistant structures, load bearing structures, masonry structures, seismic zoning of India (IS 1893:2002 Part I), seismic coefficients for different zones, definitions, irregularities in buildings, consequences of irregularities.
[08 hrs.]

UNIT-5:

Strengthening, rehabilitation and retrofitting of earthquake damaged structures
[06 hrs.]

UNIT-6:

Earthquake disaster management, mitigation and social aspects, lessons from past earthquake: - study of damages caused due to past earthquake in & outside India and remedial measures
[06 hrs.]

Text books:

SN	Title	Edition	Authors	Publications
1	Design of Earthquake Resistant Structures,	3 rd Printing 2006	Agrawal&Shrikhande,	Ashok K. Ghosh Prentice – Hall of India Pvt. Ltd.

Reference books:

SN	Title	Edition	Authors	Publications
1	Seismic Hazard and Risk Analysis.	2004	Robin K. McGuire	Publisher
2	Earthquake Tips	2005	C.V.R. Murty	NICEE, IITK
3	NICEE Guidelines for Earthquake Resistant Non-Engineered Construction	2004	www.nicee.org / iaee / E_FrontCover.pdf	National information center of Earthquake engineering Indian Institute of Technology Kanpur Kanpur 208016, India
4	Geotechnical Earthquake Engineering	1996	S.L. Kramer	Prentice – Hall of India Pvt. Ltd.

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CV419 / CV811	FE (2) ELECTIVE – I AIR POLLUTION AND SOLID WASTE MANAGEMENT	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1) To provide general understanding of air pollution, air pollutants, their sources & their effects 2) To provide knowledge and meteorological parameters of air pollution, air sampling & measurement of pollutants. 3) To provide knowledge of air pollution control equipments, air pollution due to automobiles & general Idea of noise pollution. 4) To provide understanding of solid waste management functional elements.	1. An ability to understand the type, sources & effect of air pollutants 2. An ability to understand the parameters affecting air pollution and various methods of measurement and estimation of pollutants 3. An ability to understand basics of noise pollution 4. An ability to understand various air pollution control equipments & pollution caused due to automobile exhaust 5. An ability to understand the concepts of solid waste management..
Mapped Program Outcomes: a,c,d,e,f,h,i,j	

UNIT-1:

Introduction to air pollution: Definition, air pollution episodes, atmosphere and its zones, classification and sources of air pollutants, effects of air pollutants on man, plants animal & materials

[09 hrs.]

UNIT-2:

Meteorology and air pollution: Primary and secondary parameters, atmospheric stability, plume behavior, air sampling and measurement: ambient air sampling and stack sampling, collection of particulates and gaseous pollutants, methods of estimation.

[09 hrs.]

UNIT-3

air pollution control methods and equipment: Principle of control methods for particulates and gaseous pollutants, gravity settlers, electrostatic precipitators, bag filters cyclones, wet scrubbers, automobile exhaust: Pollution due to diesel and petrol engines, exhaust treatment and abatement, noise Pollution: Sources, ill effects, control measures.

[09 hrs.]

UNIT-4:

Introduction to solid waste management, sources, quantity and quality: sources of solid waste, classification and components, physical and chemical characteristics, per capita contribution, sampling and analysis.

[09 hrs.]

UNIT-5:

Collection and transportation of solid waste: method of collection, equipment used for collection and transportation, transfer stations, solid waste processing: methods of processing, choice of methods, merits and demerits of various methods.

[09 hrs.]

UNIT-6:

Composition of waste: method of composting, factors affecting composting, sanitary land filling: Site requirements, methods, leachate management, Incineration: Principles of incineration, types of incinerators, advantages and disadvantages.

[09 hrs.]

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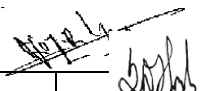
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Civil Engineering

CV419 / CV811	FE (2) ELECTIVE – I AIR POLLUTION AND SOLID WASTE MANAGEMENT	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Text books:				
SN	Title	Edition	Authors	Publications
1	Air Pollution	01-Jun-1988	M.N. Rao & H.V.N. Rao	Tata McGraw Hill Publishing Co. Ltd
2	Environmental Pollution Control Engineering	01-Jan-2007	C.S. RAO	New Age International, Wiley Eastern Ltd. New Delhi.
3	Air pollution	1973 Vol I to X	Stern A. C.	Academic Press
4	Solid Waste Management in Developing countries	1983	A.D. Bhide & Sunderesan B.B.	INSDOC, New Delhi
5	Intgrated Solid Waste Management Engineering Principle and Management Issues	1993	Tohobanogous	McGraw-Hill
6	Air Pollution	1995	K. V. S. G. Murlikrishna	Kaushal & Company

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CV 405 / CV 707	STEEL STRUCTURES	L=3	T=1	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	4 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Learn the behavior and design of 1. Structural steel components and to gain an educational and comprehensive experience in the design of steel structures. 2. The course is structured to introduce inelastic analysis of steel structures, issues of strength and stability and its application to design for cases of extreme loading, and related code provisions. 3. Advanced design topics such as torsion, flexural-torsional buckling of columns, thin webs of plate girders, bracing against LTB and frame instability	1. An ability to understand the structural properties of various standard steel sections 2. An ability to understand the basic methods of design of Steel Structures and relevant codal provisions 3. An ability to understand the load assessment of roof truss 4. An ability to understand structural design of various components of steel structure using codal provisions.
Mapped Program Outcomes: a,c,e,f,l,m	

UNIT-1:

Steel as a structural material, various grades of structural steel, properties, various rolled steel sections structural pipe (tube) sections, rectangular and square hollow sections, their properties, design of tension and compression members by working stress method

[6 Hrs]

UNIT-2:

Introduction to Limit State Method Design of tension members and compression members Behavior of bolted and welded connections: types, designations, properties, permissible stresses, failure of moment resistant bolted and welded connection, design of simple bolted and welded connections.

[7 Hrs]

UNIT-3

Design of restrained and unrestrained simple & built up beams.

[7 Hrs]

UNIT-4:

Basic industrial workshop plan, position of columns, types of trusses, load transfer mechanism, behavior of each component of industrial building. Load assessment for DL, LL and WL, for roof trusses.

[6 Hrs]

UNIT-5:

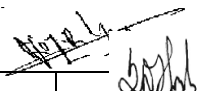
Design of axially loaded built up columns: Laced and battened.
 Column bases: slab base, gusseted base, moment resistant bases.

[6 Hrs]

UNIT-6:

Design of welded plate girder, introduction to gantry girder (analysis and design are not expected)

[7 Hrs]

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CV 405 / CV 707	STEEL STRUCTURES	L=3	T=1	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	4 Hrs

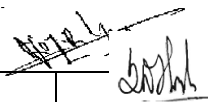
Text books:

SN	Title	Edition	Authors	Publications
1	Design of Steel Structures	Jul (2000)	V.N. Vazirani & M.M. Ratwani	Khanna Publishers, Delhi-6
2	Design of Steel Structures	Edition (Year of publication)	M. Raghupati	Tata McGraw Hill Publishing Company Limited
3	Design of Steel Structures	2nd Edition (1997)	L.S. Negi	Tata McGraw Hill Publishing Company Limited
4	Design of Steel Structures	Edition (Year of publication)	S. Ramamruthan, R. Narayanan	DhanpatRai and Sons

5	Design of Steel Structures	Edition (Year of publication)	Subramanyam	Publisher
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Reference books:

SN	Title	Edition	Authors	Publications
1	Design of Steel Structures,	2 nd reprint (2005)	B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain	Laxmi Publications Ltd
2	Design of Steel Structures,	Edition (Year of publication)	A.S. Arya, J.L.Ajmani	Nem Chand and Bros, Roorkee

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
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CV-413/PE(3)	NATURAL RESOURCES MANAGEMENT	L=3	T=1	P=0	CREDITS =4
EVALUATION SCHEME					
MSE-I	MSE-II	TA	ESE	TOTAL	ESE DURATION
15	15	10	60	100	3 hours

COURSE OBJECTIVE	COURSE OUTCOMES
<ol style="list-style-type: none">1. To understands integrated and multidisciplinary approach of Earth-Science, Life-Science, Environmental Science, Social Science and Management Science to manage and restore natural resources and ecosystems.2. To study the various resources within wilderness, forestry, recreational, agricultural and urban areas and the skills to address management problems3. To know how to conserve natural resources and wildlife property4. To develop the understanding about social aspect of civil engineering students	<ol style="list-style-type: none">1. An ability to understand concept of issues like Environmental Degradation and Unsustainable Consumption of Resources2. An ability to understand the significance of Natural resources in the growth and prosperity of the nation.3. An ability to understand the significance of Rural Development Programme4. An ability to understand the importance of renewable energy to counter environmental degradation
Mapped Program Outcomes: a, d, f, h, i, j	

UNIT-I**Introduction to Natural Resource Bases:**

Concept of resource, classification of natural resources. Factors influencing resource availability, distribution and uses. Interrelationships among different types of natural resources.

Forest resources: forest vegetation, status and distribution, major forest types and their characteristics. Use and over-exploitation, deforestation

Land resources: Land as a resource. Dry land, land use classification, land degradation, man induced landslides, soil erosion and desertification

Energy resources: Growing energy needs, use of alternate energy sources

Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

UNIT-II**Renewable And Non Renewable Energy**

Global energy: Hydropower, Tidal, Solar, Wind, Nuclear, Geothermal.

Rural energy/Biomass to energy: Wood energy/ fuel wood use, Biochemical conversion, sources of energy generation, agro residues, anaerobic digestion and biogas production, thermo-chemical conversions, gasification and types of gassifiers, ethanol.

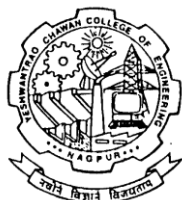
Bio-diesel: History, production methods, fuel quality, standards and properties, raw materials and applications, bio-diesel potential in India, ecological impacts of bio-fuel cultivation.

UNIT-III**Natural Resources Governance And Policy**

Overview of legal policy instruments in Natural Resource Management: National Forest Policy of 1988, National Environment Policy of 2004, National Conservation Policy, National Action Plan on Climate Change of 2008, Wildlife Protection Act of 1972, Forest Protection Act of 1980, Environment Protection Act of 1986

Applications and case studies in NRM: Coastal zone management, disaster management, forestry and wildlife management, land use/cover mapping, tracking water resources (surface and underground water mapping), weather monitoring

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CV-413	PE(3) : NATURAL RESOURCES MANAGEMENT	L=3	T=1	P=0	CREDITS =4
EVALUATION SCHEME					
MSE-I	MSE-II	TA	ESE	TOTAL	ESE DURATION
15	15	10	60	100	3 hours

UNIT-IV**Rural Development Programme**

People's participation in forestry: Joint Forest Management in India: background, need and focus, policy perspective and implementation methods

Rural Development Programme and Schemes – MNREGA Components of NRM and RD, PMGSY, DRDP, WFP, NRHM, SSA Integrated Rural Development Programme, Rural Livelihood Programmes and Projects

UNIT-V**Land Management -**

Land use Pattern of Indian Farmers, Land use Classification and Planning. Dynamics of soil fertility and farming. Factors associated to crop selection and cropping pattern. Concept of zero tillage and organic agriculture..Biofuel plantation in wasteland areas – Problems and Prospects.Importance in land management.

UNIT-VI**Wildlife Conservation And Management**

Urban Forestry, Biodiversity And Landscape

Concepts: Urban greens, landscape, urban forestry and biodiversity, global perspectives of urban forestry, human dimensions, urban forests and climate change, migration, Urban poverty and livelihood. Environmental problems in urbanizing world.

Watershed Management

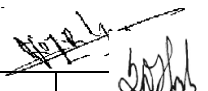
Definition and scope: Concept, delineation from topographical maps, remote sensing and GIS mapping, watershed problems and characteristics, types, important objectives in management and development

Recommended Books:**Text Book:**

1. **Francois Ramade 1984.** Ecology of Natural Resources. John Wiley & Sons Ltd.
2. **Singh, Rajvir. 2000.** Watershed Planning and Management
3. **Krishnamurthy, K.V. 2003.** Textbook of Biodiversity. Science Publications
4. **Tiwari, G.N. and M. K. Ghosal. 2005.** Renewable Energy Resources: Basic Principles and Application, Narosa Publishing
5. **Ginley, David S., and David Cahen. 2011.** Fundamentals of Materials for Energy and Environmental Sustainability. Cambridge
6. **Knight, Richard L., editor, et al. 1995.** A New Century for Natural Resources Management. Island Press.
7. **Harris, J.M. 2006.** Environmental and Natural Resource Economics: A Contemporary Approach, 2nd edition. Houghton Mifflin
8. **Malhotra, KC and Prodyut Bhattacharya. 2010.** Forest and Livelihood. Pub. Centre for Economic and Social Studies. Hyderabad

Reference books:

1. **Bookhout, T.A. 1996.** Research and Management Techniques for Wildlife and Habitats, 5th edition. The Wildlife Society, Allen Press.
2. **Rangarajan M. 2001.** India's Wildlife History. Permanent Black
3. **Konjendijk,, et al. 2005.** Urban Forests and Trees. Springer.
4. **Krishnamurthy, K.V. 2009.** An Advanced Textbook on Biodiversity Principles and Practice. Oxford and IBH.
5. **Shiva, M.P. 1998.** Inventory of Forest Resources for Sustainable Management and Biodiversity Conservation. India
6. **Heathcote, I.W. 1988.** Integrated Watershed Management: Principles and Practices. John Wiley and Sons

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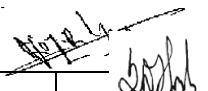
BE SoE and Syllabus 2010-11
Civil Engineering

CV 406	Training	L=3	T=0	P=4	CREDITS = 3
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Evaluation Scheme	MSE – I	MSE – II	TA	ESE	TOTAL	ESE Duration
	--	--	--	--	100	--

COURSE OBJECTIVE	COURSE OUTCOMES
1) To get information about latest methodologies and techniques used in the field of civil engineering. 2) To understand current practices adopted in construction management.	1) An ability to prepare detail notes and reports. 2) An ability to communicate effectively.
Mapped Program Outcomes: d,g,i,j,k	

Student would be required to undergo a practical training for two months during the summer vacation after 6th semester. They would submit a report about the same and also make the presentation for evaluation.

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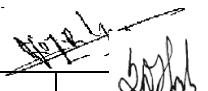
BE SoE and Syllabus 2010-11
Civil Engineering

CV 407 / CV 804	PROJECT – PHASE I	L=0	T=0	P=4	CREDITS = 4
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Evaluation Scheme	MSE – I	MSE – II	TA	ESE	TOTAL	ESE Duration
	--	--	40	60	100	--

COURSE OBJECTIVES	COURSE OUTCOME
<ol style="list-style-type: none"> To apply basic knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning. To plan for designing a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyzing basic data. To interact with multidisciplinary teams, tackle engineering problems. To use knowledge of contemporary issues and use the techniques or skills necessary for engineering practices. To plan for analyzing RCC or steel structures and draw civil engineering structures and plan for approximate cost analysis. 	<ol style="list-style-type: none"> An ability to apply basic knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning. An ability to plan for designing a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyzing basic data. An ability to interact with multidisciplinary teams, tackle engineering problems. An ability to use knowledge of contemporary issues and use the techniques or skills necessary for engineering practices. An ability to plan for analyzing RCC or steel structures and draw civil engineering structures and plan for approximate cost analysis.
Mapped Program Outcomes: a,b,c,d, e,f, g,h, i,j, k,l,m,n	

Project will be allotted to a group of students, (preferably not more than 06) as per their choice and previous scores. The project work will be carried out by the students as directed by their guides. Evaluation will be done by continuous assessment and will be based on involvement of the student in the work.

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Syllabus Of VIII Semester Civil Engineering

CV 421 / CV 812	ESTIMATING AND COSTING	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	4 hours

COURSE OBJECTIVES	COURSE OUTCOMES
<p>1. To understand the importance of subject and definition involved in the estimation of various structures.</p> <p>2. To understand the estimates of buildings (Load bearing and framed structure) culverts, Hydraulic structures water supply and sanitary works etc. Earthwork estimates in road, hill roads and canals. Detail estimates of steel in RCC works with bar bending schedule.</p> <p>3 To understand the procedure of submitting the tenders and types of contracts.</p> <p>4 To understand the writing and developing detailed specification of items and finding out quantities of various materials in different items.</p> <p>5 To understand the concept of valuation, methods of valuation and rent fixation.</p> <p>6 To understand the methods of accounting</p> <p>Mapped Program Outcomes: a,e,h,i,n</p>	<p>1. An ability to understand the definitions in estimates of structures.</p> <p>2. An ability to develop the specifications and find out the quantities of materials in different items to prepare the estimate</p> <p>3. An ability to workout the valuation and rent of civil engineering structures</p> <p>4. An ability to do accounting</p> <p>5. An ability to workout the estimate and costing of building, road, hydraulic structures etc. [Field problems]</p> <p>6. An ability to fill the tenders and carry out the construction of civil engineering structures</p>

UNIT-1:

General: Importance of the subject, purpose of quantity estimates, mode and unit of measurement as per I.S.1200, methods and stages of estimates, items of a work and their description, Approximate estimation of Civil engineering works.

Proposal and Development of Project: Project Management Consultant & their role, various important terminologies required like work charged establishment, muster roll, contingencies, percentage charges, measurement book, overheads etc.

[09 Hrs.]

UNIT-2:

Specifications: Purpose and principles of specifications, types of specifications, writing and developing detailed specifications of important items.

Cost Build up: Purpose and principles, importance of Schedule of rates (CSR) in cost estimates, factors affecting analysis of rates, information from National Building Organization, task work, factors affecting task work, market rates, escalation

[08 Hrs.]

UNIT-3

Valuation: Purpose of valuation, factors affecting value of property price and cost, market value, potential value, sentimental value, scrap value etc. real estate, guide edged securities, net and gross return, tenure of land, valuation of land, free hold and leasehold, sinking fund, depreciation, capitalized value, methods of valuation, differed annuity, time cost relationship, valuation table and rent fixation

[09 Hrs.]

UNIT-4:

Cost Accounting: Various methods, classification of cost, direct and indirect charges, distribution of overheads, M.A.S. Account, issue rates and store account. earthwork estimates in road, hill roads and canals. Mass excavation and mass haul curves.

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CV 421 / CV 812	ESTIMATING AND COSTING	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	4 hours

UNIT-5:

Quantity and cost estimates: Methods of detailed estimates, forms used for detailed estimates, working out the quantities of various materials required for construction of different Civil Engineering works like building, road works etc., detailed estimates of steel in RCC works, bar bending schedule

[08 Hrs.]

UNIT-6

Arranging Works : Construction agencies, method of carrying out works, arranging contract works, pretender and contract planning, tender notice, acceptance of tender, essentials of contract, types of contracts, conditions of contract, contract documents, various schedules in the tender document, measurement and payment to contractor, arbitration

[09 Hrs.]

Text books:				
SN	Title	Edition	Authors	Publications
1	Estimating, Costing, Specification & valuation in Civil Engineering	2010	Chakraborti M.	UBS Publication, Calcutta

Reference books:				
SN	Title	Edition	Authors	Publications
1	Estimating & Costing	2010	Chandola S.P. & Vazirani V.N.	Khanna Publishers 2-B, Nath market, Naisarak, Delhi
2	Estimating & Costing in civil Engineering -	February 1999	Dutta B.N.	UBS Publishers distributors ltd., 5 Ansari road, New Delhi.
3	Estimating, Costing and valuation	2011	Rangwala S.C.	Charotar Publishing house, opposite Amul diary, court road, Anand

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CV 422 / CV 710	TRANSPORTATION ENGINEERING – II			L=4	T=0	P=0	CREDITS = 4
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration	
	15	15	10	60	100	3 HOURS	

COURSE OBJECTIVES	COURSE OUTCOMES
1. To acquaint development of railway transportation in India. 2. To understand geometric design of railway tracks 3. To know zoning laws for development of air transportation in India 4. To study tunnel alignment and necessity of tunnels.	1. 1An ability to update and upgrade knowledge about transportation system in India 2. An ability to design railway tracks, crossings 3. An ability to avail information about development of air transportation in urban areas 4. An ability to understand the construction of tunnel and advances in tunneling
Mapped Program Outcomes: a,c,e,j,k	

UNIT-1:

Railways: Transportation and its development, long term operative plans for Indian Railways, classification, lines and their track standards, Railway terminology, Administration & management, traction and tractive resistance, hauling capacity and tractive effort of locomotives, different types of tractions

[7 Hrs]

UNIT-2:

Permanent Way: Alignment surveys, requirement, gauges, track section, coning of wheels, stresses in railway track, high speed track, rail types and functions, selection for rails, test on rail wear & defects, corrugation and creep of rails, rail joints, short and long welded panels

Sleepers: Function, types, merits and demerits, sleeper density, ballast cushion, ballast section, rail fixtures and fasteners

Geometric design of railway track: Gauge, gradients, speed, super elevation, cant deficiency negative super elevation, curves, length of transition curves, grade compensation

Points and crossing: Left and right hand turnouts, design calculations for turnouts & crossovers, railway track functions

[7Hrs]

UNIT-3

Station and Yards: Types, functions, facilities & equipments

Railway Signaling and interlocking: Objects and principles of signaling, classification and types of signals, control and movement of trains, track circulation, necessity of interlocking, methods and mechanical devices, railway track construction, inspection & modern techniques of maintenance, modern technology related to track & tractions, rolling stock, signaling & controlling

[7 Hrs]

UNIT-4:

History of Air Transportation in India: Comparison with other transportation modes, aircraft components and characteristics, airport site selection, modern aircrafts

Airport obstructions: Zoning laws, imaginary surfaces, approach and turning zone, clear zone, vertical clearance for highway & railway

Runway And taxiway design: Windrose diagram, cross wind component, runway orientation and configuration, basic runway length and corrections, runway geometric design standards, taxiway layout and geometric design standards, exit taxiway

[7 Hrs]

UNIT-5

Airport layout and classification: Terminal area, aircraft parking and parking systems, unit terminal concept, aprons, hangars, International airports layout, phase development, helipads and heliports

Visual Aids: Airport marking and lighting for runways, taxiways and other areas

Air traffic control: Need, networks, control aids, instrumented landing systems, advances in air traffic control

[7 Hrs]

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CV 422 / CV 710	TRANSPORTATION ENGINEERING – II			L=4	T=0	P=0	CREDITS = 4
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration	
	15	15	10	60	100	3 HOURS	

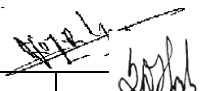
UNIT-6:

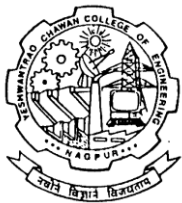
Tunnels: Alignment, surveys, cross section of highway & railway tunnels, tunneling methods in hard rock and soft grounds, tunnel lining, drainage, ventilation and lighting of tunnels, advances in tunneling techniques, tunnel boring machines, case studies

[7 Hrs]

Text books:				
SN	Title	Edition	Authors	Publication
1	A Text Book of Railway Engineering	2005	S. C. Saxena and S. P. Arora	DhanpatRai Sons New Delhi
2	Airport Planning and Design	1999	S. K. Khanna	Nem Chand and Brothers, Roorkee

Reference books:				
SN	Title	Edition	Authors	Publications
1	Textbook on Transportation Engineering	2001	S. P. CHANDOLA	S. Chand Publishers, New Delhi
2	Planning and Design of Airports	Fifth Edition 2010	Robert Horonjeff, Francis Mckelvey, William Sproule, Seth Young	McGraw Hill Professionals

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CV 427 / CV816	PE (4) WASTE WATER TREATMENT			L=4	T=0	P=0	CREDITS = 4
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration	
	15	15	10	60	100	3 hours	

COURSE OBJECTIVES	COURSE OUTCOMES
1. To study necessity and objectives of water treatment and layout of a water treatment plant. 2. To study principles of working and design of various waste water treatment units and processes. 3. To study necessity of wastewater treatment and disposal methods for wastewater. 4. To study principle of working and design of various wastewater treatment units and processes.	1. An ability to understand the necessity of water quality management 2. An ability to design various treatment units for waste water 3. An ability to understand advanced treatment processes for waste water 4. An ability to understand treatment of waste water from various industries.
Mapped Program Outcomes: a,c,e,f,h,j	

UNIT-1:

Concept of water quality management, Indian standards and laws, wastewater characteristics and their significance, disposal methods for wastewater on land and in water and its impact, self-purification of streams

[08 Hrs.]**UNIT-2:**

Preliminary and primary treatment processes and units, design of bar screens, grit chamber and primary settling tank

[09 Hrs.]**UNIT-3**

Secondary treatment processes for sewage, concepts in biological treatment, bacterial growth and biological oxidation, kinetics of biological growth, activated sludge process, trickling filter, simple design problems

[09 Hrs.]**UNIT-4:**

Biological treatment units such as aerated lagoons, stabilization ponds, up flow sludge blanket reactors, fixed film reactors, treatment of sludge

[08 Hrs.]**UNIT-5**

Need of advanced treatment, removal of trace organics, micro filtration and control of nutrients, nitrification and de-nitrification, removal of phosphorus

[09 Hrs.]**UNIT-6:**

Treatment alternatives for Industrial waste, volume reduction, strength reduction, equalization tank, neutralization tank, chemical precipitation

Specific industrial wastewater treatment for paper and pulp industry, sugar industry, distillery industry, dairy industry, textile industry

[09 Hrs.]

Text books:				
SN	Title	Edition	Authors	Publications
1	Wastewater engineering	2010	B.C. Punmia	Laxmi Publications (P) Ltd., New Delhi
2	Sewage Treatment & Disposal and Waste Water Engineering, Vol-2	2008	P. N. Modi	Standard Book House
3	Water Supply Engineering: Environmental Engineering (Volume-2)	2010	S. K. Garg	Khanna Publication

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CV 427 / CV816	PE (4) WASTE WATER TREATMENT	L=4	T=0	P=0	CREDITS = 4
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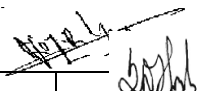
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 hours

Text books:

4	Waste Water Treatment	2007	M. N.Rao	Oxford and IBH Publishing
5	Industrial Waste Water Treatment	2008	Patwardhan	PHI Learning Pvt. Ltd.
6	Waste Water Treatment: Concept and Design Approach	2006	G. L. Karia & R. A. Christian	PHI Learning Pvt. Ltd.

Reference books:

SN	Title	Edition	Authors	Publications
1	Wastewater treatment disposal and reuse	2006	Metcalf and Eddy	Tata McGraw-Hill Publishing Company Ltd., New Delhi

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CV 428 / CV 817	PE (4) EARTHQUAKE ENGINEERING	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I 15	MSE-II 15	TA 10	ESE 60	Total 100	ESE Duration 3 hours
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COURSE OBJECTIVES	COURSE OUTCOMES
<ol style="list-style-type: none">1. To understand the basic concepts regarding earthquake and its measurements and recording.2. To understand effect of earthquake on RCC members.3. To understand design of earthquake resistant RCC structures.	<ol style="list-style-type: none">1) The course an introduction giving fundamental concept, principle and application of earthquake engineering.2) Concept of response spectrum analysis to determine structure response and design earthquake forces explained.3) The codal provision for earthquake resistance design of structures as per Indian standard are explained.4) The course covers a number of chosen problems to be solved to illustrate the design and analysis concepts clearly.5) It will very useful to UG students.

Mapped Program Outcomes: a,b,c,d,e

UNIT-1:

Origin of earthquakes, engineering geology, seismicity of the world, faults, earthquake waves, quantification of earthquake (magnitude, energy, intensity of earthquake), measurements of earthquake, analysis of earthquake records and its interpretation

[09 Hrs.]

UNIT-2:

Determination of magnitude, epicenter, epicenter distances, focal depth, seismic zoning, ground motion and their characteristics, factors affecting ground motions, causes or sources of earthquake damages, evaluation of seismic hazards, concept of response spectra, generation of response spectrum from available earthquake records

[08 Hrs.]

UNIT-3

Study of IS: 1893, IS: 13920 for analysis and ductile detailing of RCC structures and other related codes, concept of earthquake resistant design, design philosophy, virtues of earthquake resistant design.

[08 Hrs.]

UNIT-4

Design and detailing of RCC members, beam, column and beam-column joints for ductile behaviors, calculation of base shear distribution to various floors

[09 Hrs.]

UNIT-5

Special aspects in multi-storey buildings, effect of torsion, flexible first storey, P-delta effect, and soil-structure interaction on building response, drift limitation, soil liquefaction during earthquakes

[08 Hrs.]

UNIT-6:

Load bearing structures, masonry structures, strengthening and rehabilitation of non-engineered building for earthquake, earthquake disaster management, mitigation and social aspects, lessons from past earthquakes

[08 Hrs.]

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CV 428 / CV 817	PE (4) EARTHQUAKE ENGINEERING	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 hours

Text books:

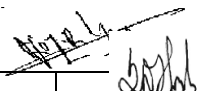
SN	Title	Edition	Authors	Publications
1	Earthquake Resistant Design of Structures	2009	Manish Shrikhande and PankajAgrawal	Phi Learning Pvt. Ltd.

Reference books:

SN	Title	Edition	Authors	Publications
1	Handbook on seismic analysis and design of structures	03-2001	FarzadNeaim	Springer VerlagGmgh
2	Earthquake Tips	2005	C. V. R. Murthy	National Information Center of Earthquake Engineering, Indian Institute of Technology Kanpur 208016
3	Earthquake engineering	January/March 1976	A.S.Arya	University of Nottingham
4	Geotechnical Earthquake Engineering	2003	S.L.Kramer	Prentice Hall, New Jersey

IS Code:

- 1) IS: 1893-2002 Earthquake criteria
- 2) IS: 13920-1993 ductile detailing
- 3) IS: 4326 Earthquake Resistant Design and Construction of Buildings – Code of Practice

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CV 429 /CV 818	PE (4) MATRIX ANALYSIS OF STRUCTURES	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 hours

COURSE OBJECTIVES	COURSE OUTCOMES
At the end of the course the student will be able to understand 1) Basic concepts of direct stiffness method. 2) Analysis of various structural elements by stiffness method	1. An ability to understand the stiffness method for analyzing statically indeterminate structures 2. An ability to model the behavior of various structural elements and systems 3. An ability to understand the effect of various loading and support conditions on structural elements and systems 4. An ability to implement the computer program to analyse the structures
Mapped Program Outcomes: a,e,g,h,j,k,l,m	

UNIT-1:

Basic terminology, degree of freedom, basic concept of direct stiffness method, derivation of all stiffness coefficients, formulation of compatibility equations, rotation transformation matrix.

Analysis of Beam (without axial deformation): Formulation of elemental stiffness matrix for Beam, transformation matrix, assembly of global stiffness matrix, member load matrix due to concentrated load, uniformly distributed load and moment, assembly of global load matrix, solution to problem with maximum three degree of freedom

[08 Hrs]

UNIT-2:

Analysis of Plane Truss: Formulation of elemental stiffness matrix and global stiffness matrix, assembly of global stiffness matrix, member load matrix due to concentrated load, uniformly distributed load, assembly of global load matrix, solution to problem with maximum three degree of freedom.

[09 Hrs]

UNIT-3

Analysis of Plane Frame (Without axial deformation): Formulation of elemental stiffness matrix and transformation matrix, assembly of global stiffness matrix, member load matrix due to concentrated loads, uniformly distributed loads and moments, assembly of global load matrix, solution to plane frame problems with maximum three degree of freedom, inclined member problem.

[08 Hrs]

UNIT-4:

Analysis of Plane frame(With axial deformation): Formulation of elemental stiffness matrix and transformation matrix, assembly of global stiffness matrix, member load matrix due to concentrated loads, uniformly distributed loads and moments, assembly of global load matrix, solution to plane frame problems with maximum three degree of freedom, inclined member problem

[09 Hrs]

UNIT-5

Analysis of Plane Grid: Formulation of elemental stiffness matrix, transformation matrix, assembly of global stiffness matrix, member load matrix due to concentrated loads, uniformly distributed loads and moments, assembly of global load matrix, solution to plane grid problems

[09 Hrs]

UNIT-6:

Analysis of Member for temperature loading, initial joint displacement (sinking of support), lack of fit in trusses, storing of global stiffness matrix, full storage, banded storage and band minimization.

[09 Hrs]

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CV 429 /CV 818	PE (4) MATRIX ANALYSIS OF STRUCTURES	L=4	T=0	P=0	CREDITS = 4
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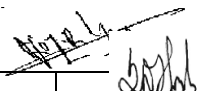
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 hours

Text books:

SN	Title	Edition	Authors	Publications
1	Matrix Method of Structural Analysis,	2003	Meghre A.S. &Deshmukh S.K.	Charotar publishing house, Anand
2	Matrix Method of Structural Analysis	2004	Gere and Weaver	CBS Publication

Reference books:

SN	Title	Edition	Authors	Publications
1	Matrix Method of structural Analysis	1994	Kanchi M.B.	John Wiley & Sons
2	Introduction to Matrix Method of Structural Analysis	1966	Martin H.C.	McGraw-Hill Publications
3	Computer Analysis of Structures	1996	Flemming	Prentice Hall
5	Intermediate Structural Analysis,	2010	Wang C K,	Tata McGraw Hill Publication, New Delhi
6	Theory of Structure,	2nd	Timoshenko S.P. and D.H. Young	Tata McGraw Hill Publication, New Delhi
7	Theory of Elasticity	3 rd (1985)	Timoshenko S.P. and J.N. Goodier	Tata McGraw Hill Publication, New Delhi
8	Computational Structural Mechanics	2004	S. Rajasekaran, G. Sankarasubramanian	PHI Learning Pvt. Ltd.
9	Structural Analysis: A Matrix Approach	2001	Pandit Gupta	Tata McGraw-Hill Education

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CV 432 / CV 821	PE (5) WATER TRANSMISSION AND DISTRIBUTION SYSTEMS	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 HOURS

COURSE OBJECTIVE	COURSE OUTCOMES
The students will learn the:- 1) Reservoir, pump, various valves in distribution system. 2) Analysis of flow in looped networks using various methods. 3) Analysis of flow in serial networks using node flow analysis. 4) Optimal and Economical diameter of pumping main 5) Design of water distribution networks 6) Optimization of water distribution network.	1. An ability to understand the Reservoir, pump, various valves in distribution system 2. An ability to understand Analysis of flow in looped networks using various methods 3. An ability to understand Analysis of flow in serial networks using node flow analysis 4. An ability to understand Optimal and Economical diameter of pumping main 5. An ability to understand Design of water distribution networks 6. An ability to understand Optimization of water distribution network.
Mapped Program Outcomes: a,c,e,g,h	

UNIT-1:

General Hydraulic Principles, Head loss formulae- Darcy-Weisbach formula, Hazen – Williams formula, Modified Hazen - Williams formula, minor losses, continuity equation, Series and Parallel connection of Pipes, Equivalent length of Pipes, Three Reservoirs, multi- reservoir, Pumps and Valves (check valve, flow control valve and pressure reducing valve) in Water distribution systems.

[08 Hrs.]**UNIT-2:**

Types of network, Formulation of Equations for looped Water Distribution Networks, Analysis of flow in looped networks using Hardy-Cross method, Newton-Raphson and Linear Theory methods.

[09 Hrs.]**UNIT-3**

Node flow analysis of water distribution networks (NFA): Necessity of node flow analysis, classification of node according to HGL, classification of node according to flow, compatibility, node head-discharge relationship, Application of NFA technique to serial networks.

[08Hrs.]**UNIT-4:**

Optimal and Economical diameter of pumping main. Design of pumping main considering rising main diameter as continuous as well as discrete variable. Estimation of Reservoir capacity using analytical method.

[09 Hrs.]**UNIT-5:**

Design of water distribution networks: Design of single source branching network using Critical path method, Determining number of branching configuration for a looped network by graph theory, Use of path concept and minimum spanning tree concept.

[09 Hrs.]**UNIT-6**

Formulation of optimization model, Application of critical path method for design of looped networks. Application of Cost-head loss ratio method and linear programming technique to optimal design of branched networks.

[09 Hrs.]

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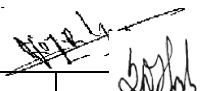
CV 432 / CV 821	PE (5) WATER TRANSMISSION AND DISTRIBUTION SYSTEMS			L=4	T=0	P=0	CREDITS = 4
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration	
	15	15	10	60	100	3 HOURS	

Text books:

SN	Title	Edition	Authors	Publications
1	Optimal design of water distribution networks	2003-12-04	Bhave, P.R.	Alpha science International Ltd
2	Analysis of Water Distribution Networks	2006-09-18	Bhave P.R., & Gupta R.	Alpha science International Ltd

Reference books:

SN	Title	Edition	Authors	Publications
1	Analysis of flow in pipe networks	June 1976	Jeppson, R.W.	Butterworth-Heinemann
2	Analysis of water distribution systems	November 1992	Walski, T. M.	Krieger Publishing Company
3	Manual on Water Supply and Treatment	-----	CPHEEO, Ministry of Urban Development, New Delhi, 2005	CPHEEO, GOI

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CV 433 / CV 822	PE (5) ADVANCED STEEL DESIGN	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I 15	MSE-II 15	TA 10	ESE 60	Total 100	ESE Duration 3 HOURS
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COURSE OBJECTIVES	COURSE OUTCOMES
1.Understand different types of loading with respect to structural parameters. 2.Application of IS code & SP code for detailing and drafting of different structural components. 3.Analysis and design of different types of structures	1. An ability to understand the necessity of different type of bridges and storage vessels. 2. An ability to analyse and design different types of brides and storage vessels as per codal provision 3. An ability to analyse and design different towers 4. An ability to understand fundamentals of plastic analysis of steel structures
Mapped Program Outcomes: a,c,e,f,h,i,l,m	

UNIT-1:

Bridges: Types of bridges, foot Bridge, road bridge, railway bridge, rolled beam bridges, plate girder bridges, trussed bridge, through and deck type bridges, weight of bridge truss by empirical formulae, loading on footways, IRC loading, loading on railway bridges, design of footbridge, design of components of railway and road bridges

Bearings-Types of bearings, bearing pads, introduction to rocker, roller and elastomeric bearings.

[13 Hrs.]

UNIT-2:

Storage Vessels - Design of bunkers and silos, Janssen's theory, Airy's theory, design criteria, analysis & design of Bins, design of water tanks, circular tanks with segmental bottom, rectangular pressed steel tanks, and design of staging.

[13 Hrs.]

UNIT-3

Tower: Introduction to transmission line and communication towers, various types, tower configurations, calculation of loads for design of various types of towers, analysis & design of towers.

[13Hrs.]

UNIT-4:

Plastic analysis of steel structures: Fundamentals, static and kinematic theorem, equilibrium and mechanism methods of analysis

Composite construction: General concepts, properties, steel – concrete composites design of encased beams, columns and shear connectors, advance welding techniques and approximate estimates

[13 Hrs.]

Text books:				
SN	Title	Edition	Authors	Publications
1	Design of steel structures	2007	A. S. Arya and J.L. Ajmani	Nem Chand Bros, Roorkee

Reference books:				
SN	Title	Edition	Authors	Publications
1	Design of steel structures, Vol II	2010	Ramachandra	Standard Book House, New Delhi
2	Design of Steel Structures	2010	S.K. Duggal	Tata McGraw Hill, Publishing Co. Ltd.
3	Design of Steel Structures	Dec 31, 2004	P. Dayaratnam	S. Chand Publications

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CV 434 / CV 823	PE (5) MAINTENANCE AND REHABILITATION ENGINEERING	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 HOURS

COURSE OBJECTIVES	COURSE OUTCOMES
1.To know how to plan and management maintenance of structures 2. Get knowledge of materials and techniques for maintenance. 3.To understand importance of research in maintenance	1. To understand need and necessity of maintenance management. 2. Scope and exposure of research for maintenance 3 To have industry oriented knowledge for maintenance planning.
Mapped Program Outcomes: a,b,c,h,j,k	

UNIT-1:

Introduction: Deterioration of structures, definition of maintenance, need for maintenance of different civil engineering structures, maintenance characteristics, negligence and poor maintenance of structures, quantification of maintenance.

Classification of Maintenance Work: Servicing, rectification, replacement, planned, unplanned, preventive, corrective, predictable and avoidable maintenance works, renovation and rehabilitation, routine maintenance of buildings, specifications for maintenance works

Common Maintenance Problems: Relating to various civil engineering structures and systems, techniques of maintenance, areas prone to frequent maintenance, causes that aggravate maintenance work like high-rise buildings, special construction methods, new materials, accessibility, Environment etc., construction details for prevention

[09 Hrs]**UNIT-2:**

Factors Affecting Frequency and Magnitude of Maintenance Work: Over loading, movement of grounds, temperature variations, moisture, leakages and dampness, chemical actions and corrosion, growth of trees, earthquake, flood and fire, riots and vandalism, design defects, defects in construction and use of materials, choice of materials for durability and maintainability, design, exposure and other factors effecting durability, precautions to increase durability, effect of pollution on buildings.

Inspection, Identification and diagnosis of common defects and failures with possible causes in buildings, Roads, bridges, railway tracks, canals and C.D. Works, tunnels and special structures like service reservoirs, water supply, sewerage, storm water drains

[09 Hrs]**UNIT-3**

Preventive Maintenance: General, site selection, choice of structural systems and materials, specifications & detailing, special attention to foundations, walls, roofs, terraces, floors, doors, windows, plinth, compound walls, expansion joints and staircases to improve maintainability, water supply and sanitary works, termite control, external finishes.

Road stabilization techniques, compaction & drainage, shoulders, slope protection, joints in C. C. Pavements, routine and service maintenance, recycling, bridges and C.D. works repairs, strengthening and rehabilitation, reliability rating of existing structures and systems, service life & expected load carrying capacity, service & stability requirements, future service requirements, loads, fatigue and creep.

[09 Hrs]**UNIT-4**

Materials and Techniques for Maintenance: Materials for repairs like cement, cement grouts, epoxy grouts, mortars and coatings, polymer concrete composites, sealants, membrane overlays, fiber reinforced concrete, resin based compounds, emulsions, paints and geotextiles, techniques like stiffening, linings, guniting protection systems, prestressing, post-tensioning and base isolation technology, corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection, stitching, repair and strengthening of concrete buildings, foundation repair and strengthening, underpinning, leakage of roofs and methods of repair

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CV 434 / CV 823	PE (5) MAINTENANCE AND REHABILITATION ENGINEERING			L=4	T=0	P=0	CREDITS = 4
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration	
	15	15	10	60	100	3 HOURS	

Failure Of Buildings: Definition of building failure, functional, structural and aesthetical failures, case studies, methodology of failure investigation, diagnostic testing methods and equipments, effect of fire on buildings.

[08 Hrs]

UNIT-5

Maintenance Planning: In-depth significance of maintenance as opposed to cosmetic treatments, broad action plan, planning, budgeting and controlling the cost of maintenance work, policy formulation, standards of maintenance & controlling cost, planned maintenance, inspection cycles and condition surveys, investigation for assessing condition of structures including non-destructive evolution techniques like proof load test, photogrammetric analysis, assets and optical electric motion analysis, bovescopes, fiber optic probes, chain-dragging, acoustic emission and ultrasonic techniques, infrared thermography, high-speed non-contact sensor, sonar and sound penetrating radar techniques, reliability rating, maintenance cost records, maintenance manuals, their functions, contents and types, difficulties in planned maintenance

Conservation and Recycling – Historical buildings, conservation movement (needs), documentation, materials and methods for conservation work, recycling of old building and its advantages, case study.

[08 Hrs]

UNIT-6

Maintenance Oriented Designs: Design and its relation to maintenance, relationship between initial maintenance and running costs, cost appraisal techniques, consideration of maintenance at design stage, design needs, importance of feedback and feedback systems, information gathering, design data communication, interaction between designers and contractors, maintainability, role of design professionals

Maintenance Management: Need for data, relationship of the data base system to management process, cost of data base and management, uses of data base, problems in data collection, setting criteria from data collected, operational assessment

Research in Maintenance: Importance of research, areas of research including materials, techniques, field equipment and tools for investigation, repairs and monitoring non-destructive evaluation techniques.

[09 Hrs]

Text books:				
SN	Title	Edition	Authors	Publications
1	Concrete Technology	2009	Shetty M.S.	S.ChandPublication, New Delhi
2	Concrete for Construction - Facts and Practice	1999	Raina V.K	Tata McGraw-Hill Publishing Company Limited, New Delhi
3	SP: 25 -1984 - Hand Book on Causes and Prevention of Cracks in Buildings	1999	-	Bureau of Indian Standards, New Delhi

Reference books:				
SN	Title	Edition	Authors	Publications
1	Concrete - Building Pathology	2003	Macdonald S.	Blackwell Science Limited, Oxford
2	The Maintenance and Adaptation of Buildings	1981	Chudley, R.	Longman Group Ltd, New York,
3	Corrosion Damaged Concrete - Assessment and Repair	1987	Strecker, P.P	Butterworths, London

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CV 435 / CV 824	PE (5) FUNDAMENTAL OF REMOTE SENSING AND GIS	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 HOURS

COURSE OBJECTIVES	COURSE OUTCOMES
1) To study basic principle and uses of remote sensing. 2) To know the different elements and components of remote sensing. 3) To study the digitization, image processing and feature extraction. 4) To study special database management, overlay analysis and visualization of database elements. 5) To study cartography, map design and layout and topographical mapping or digital elevation modeling or digital terrain modeling. 6) To study different application of remote sensing and GIS like natural resources management, urban infrastructure management, environmental impact analysis etc.	1) Understands basic concept and uses of Remote Sensing. 2) Understands different elements of remote sensing. 3) Students will be able to process digital image and extract features of the images. 4) Able to manage different database and carry out overlay analyses. 5) Able to carry out mapping and digital elevation modeling or digital terrain mapping. 6) Able to apply the knowledge for different application like environmental mapping, water resources management, disaster mapping and management etc.
Mapped Program Outcomes: a, b, c, d, e, f, h, k	

UNIT-1:

Principles of Remote Sensing: Fundamentals of RS, electromagnetic energy and remote sensing, sensors, platforms and RS data acquisition systems, multispectral, hyper spectral and thermal sensors, radiometric aspects of remote sensing data, geometric aspects of remote sensing data, image enhancement and visualization, image interpretation techniques and classification, microwave thermal remote sensing, radar & laser altimetry.

[09 Hrs]

UNIT-2:

Elements of Remote Sensing System: Terrestrial, airborne and space borne platforms, Sun synchronous and geo-stationary satellites, advantages and disadvantages, various earth resources satellites, Indian remote sensing program, remote sensing data products and their types: analog and digital data formats, thermal and radar imageries, FCC

[09 Hrs]

UNIT-3

Digital Image Processing: Image rectification and restoration, image enhancements-contrast manipulations, spatial feature manipulation, multi – image manipulation, supervised and unsupervised classification, accuracy assessment and data merging

[09 Hrs]

UNIT-4

Principles of Geographical Information Systems: Geographic information and spatial data types, database management systems, spatial referencing, data quality, measures of location errors on maps, satellite-based positioning, spatial data input, data preparation, point data transformation, analytical GIS capabilities; retrieval and classification; overlay functions, neighborhood operations; network analysis; error propagation, data visualization.

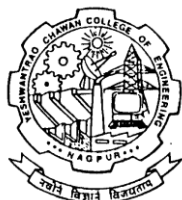
[08 Hrs]

UNIT-5

Cartography: Introduction to cartography, classification of maps, types of data, visual variables, generalization, symbolization, map design, map layout, diagrams map projection, topographic mapping, and production of large-scale maps and photo and image maps.

[08 Hrs]

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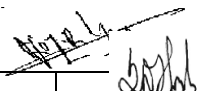
CV 435 / CV 824	PE (5) FUNDAMENTAL OF REMOTE SENSING AND GIS	L=4	T=0	P=0	CREDITS = 4
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 HOURS

UNIT-6

Applications: Integrated approach of remote sensing and GIS application: natural resource mapping, water resource management, urban infrastructure management, land information system, environmental impact analysis, GIS in utility management. **[09 Hrs]**

Reference books:				
SN	Title	Edition	Authors	Publications
1	Concepts and Techniques of GIS	2005	C.P. Lo Albert	PHI Learning
2	Remote Sensing Of the Environment - An Earth Resource Perspective	2004	John R. Jensen	Pearson Education.
3	Environmental Engineering	2010	S.K.Garg	Khanna Publishers

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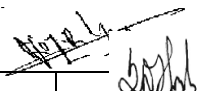
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CV 424 /CV 813	COMPREHENSIVE VIVA VOCE	L=0	T=0	P=0	CREDITS = 3
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	--	--	40	60	100	--

COURSE OBJECTIVES	COURSE OUTCOMES
1) To understand necessity to study a topic comprehensively. 2) To know various ways and means to collect data and technical information related to a topic. 3) To understand ways to present literature collected.	1) Ability to collect information regarding only topic related in civil engineering 2) Ability to present the information collected in the expected format 3) Ability to express and communicate about the information collected.
Mapped Program Outcomes: b, c, e, i	

Every student will be allotted a specific topic related to civil engineering with the consent of the student. The student will be expected to prepare a detailed note on the topic and submit it to the guide. Evaluation will be based on the extent of information provided by the student and viva voce conducted by a panel of experts constituted by the department.

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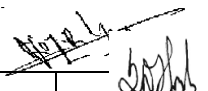
Civil Engineering

CV 425 / CV 814	PROJECT – PHASE II	L=0	T=0	P=6	CREDITS = 6
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	--	--	40	60	100	--

COURSE OBJECTIVES	COURSE OUTCOME
<ol style="list-style-type: none"> To apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning. To design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data. To work on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively. To apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices. To analyze and design RCC & steel structures, draw and prepare cost estimates of civil engineering structures. 	<ol style="list-style-type: none"> An ability to apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning. An ability to design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data. An ability to work on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively. An ability to apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices. An ability to analyze and design RCC & steel structures, draw and prepare cost estimates of civil engineering structures.
Mapped Program Outcomes: a,b,c,d, e,f, g,h,i,j, k,l,m,n	

The group of students will continue to work for the project allotted previously and will submit a project report based on their studies. Evaluation will be done continuously and viva voce conducted at the end of the semester.

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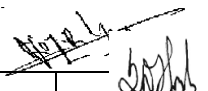
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CV 426 / CV 815	EXTRA / CO-CURRICULAR / COMPETITIVE EXAMINATION	L=0	T=0	P=0	CREDITS = 2
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Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	--	--	40	60	100	--

COURSE OBJECTIVES	COURSE OUTCOME
<ol style="list-style-type: none">1. To expose to culture and tradition.2. To provide opportunity for student to perform and present their hidden talent, still and art.3. To nurture hobbies.4. To organize co-curricular activities to make competitive spirit, cooperation, leadership, diligence, punctuality, team spirits.5. To develop creative talent, self-confidence, sense of achievement.6. To be able to design process on environmental, social, political, ethical, health and safety.7. To develop broad education to understand the impact of engineering solution in a global economic, environmental, society.	<ol style="list-style-type: none">1. An ability to develop team work, leadership qualities, competitive spirit.2. An ability to develop thinking and analysis process for environmental, ethical society.3. An ability to develop solution to engineering problems related with social, environmental and ethical issues.4. An ability to develop and nurture soft and communications skills.
Mapped Program Outcomes: a, b,c,d,f,g, h,i,k,l	

Due credits will be given to the students based on their performance and involvement in different extra and co-curricular activities conducted within the college or by other organizations/ institutions. Due credit will also be given to the student if they are successful in different competitive examinations conducted by different organizations. The guidelines as given in academic regulations will be followed for evaluation.

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