JABALPUR ENGINEERING COLLEGE, JABALPUR (MP)
(An Autonomous Institute of Govt. of M.P.)
Affiliated to Rajiv Gandhi Technological University, Bhopal (MP)
Scheme of Study and Examination (w.e.f. July 2010)

BE (PTDC) **Sem : FIFTH** **Branch : CIVIL ENGINEERING**

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
CE-20	Water Resources Engineering - I	3	1	-	10	20	30	70	100	4
CE-26	Structural Design - I (RCC)	3	1	-	10	20	30	70	100	4
CE-30	Structural Analysis - II	3	1	-	10	20	30	70	100	4
CE-31	Transportation Engineering - I	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
CE-21L	Hydrology Lab	-	-	2	20	-	20	30	50	2
CE-27L	Structural Design (RCC) Lab - I	-	-	2	20	-	20	30	50	2
CE-32L	Transportation Engineering Lab - I	-	-	2	20	-	20	30	50	2
CE-10L	Concrete Lab	-	-	2	50	-	50	-	50	2
	Total	**12**	**4**	**8**	**150**	**80**	**230**	**370**	**600**	**24**

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total Marks 600 Total Periods : 24, Total Credits : 24

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	**WATER RESOURCES ENGINEERING – I**	CE-20	Min "D"	Min "D"	5.0

WATER RESOURCES ENGINEERING – I

Unit-I : Hydrology : Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

Unit-II : Floods and Ground water: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence-causes and effects. reclamation of water logged and salt affected lands.

Unit-III : Water resources planning and management : Planning of water resources projects, data requirements, economic analysis of water resources projects appraisal of multipurpose projects, optimal operation of projects introduction to linear programming and its application to water resources projects. Role of water in the environment, rain water harvesting, impact assessment of water resources development and managerial measures.

Unit – IV : Irrigation water requirement and soil-water-crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development. Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation method. Surface and subsurface, sprinkler and drip irrigation. Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal
crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

Unit – V : Canal irrigation: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings-objectives, materials used, economics. Canal falls & cross drainage works, - description and design, head and cross regulators. Escapes and outlets, canal transitions.

Well irrigation: Types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation.

Suggested Books :-

1. Engineering Hydrology - J.NEMEC - Prentice Hall
2. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
3. Engineering Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
4. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
5. Engineering Hydrology by H.M. Raghunath

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	**STRUCTURAL DESIGN - I (RCC)**	CE-26	Min "D"	Min "D"	5.0

STRUCTURAL DESIGN - I (RCC)

Unit - I.

Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method ; Limit state methods of design, partial safety factors for load and material. Calculation of various loads for structural design . Calculation of moment of resistance of rectangular and flanged sections by WSM and LSM.

Unit - II.

Design of Beams: Singly & doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Design of beam for shear, bond and torsion.

Unit-III.

Design of Slabs: Slabs spanning in one direction. Cantilever, Simply supported and Continuous slabs, Slabs spanning in two directions, Circular slabs.

Unit -IV.

Columns & Footings: Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Isolated footings. Columns subjected to axial loads and bending moments (sections with no tension).

Unit -V.

Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, Slabless tread-riser staircase.

Design of flat slabs and waffle slabs.

NOTE : All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)

Suggested Books: -

1. Reinforced Concrete; Pillai & Menon, TMC New Delhi.
2. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
3. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi.
4. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
5. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
6. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
7. Plain & reinforced concrete – Rammuttham
8. Plain & reinforced concrete – B.C. Punnia
9. Structural Design & Drawing by N.K.Raju.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**STRUCTURAL ANALYSIS - II**	CE-30	Min "D"	Min "D"	5.0

STRUCTURAL ANALYSIS – II

Unit – I : Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

Unit – II : Plastic analysis of beams and frames.

Unit - III : Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

Unit – IV : Matrix method of structural analysis : force method and displacement method.

Unit - V : Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns.

Reference Books :

1. Wang C.K. Intermediate Structural Analysis McGraw Hill New York
2. Kinney Streling J. Indeterminate structural Analysis. Addison Wesley.
3. Reddy C.S. Basic Structural Analysis, Tata Mc Graw Hill Pub. Co. New Delhi
4. Norris C.H. Wilbur J.B. and Utkys Elementary Structural Analysis, MC Graw Hill International Tokyo
5. Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Pub.& Dis. Delhi

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**TRANSPOTATION ENGINEERING - I**	CE-31	Min "D"	Min "D"	5.0

TRANSPOTATION ENGINEERING – I

Unit – I : Introduction, Tractive resistances & Permanent way : Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations. Route Surveys and alignment, railway track, development and gauges. Hauling capacity and tractive effort.

1. Rails : types, welding of rails, wear and tear of rails, rail creep.
2. Sleepers : types and comparison, requirement of a good sleeper, sleeper density.
3. Rail fastenings : types, Fish plates, fish bolts, spikes, bearing plates, chain deys, check and guard rails.
4. Ballast : Requirement of good ballast, various materials used as ballast, quantity of ballast. Different methods of plate laying, material trains, calculation of materials required, relaying of track

Unit –II : Geometric Design ; Station & Yards; Points and Crossings & Signaling and interlocking : Formation, cross sections, Super elevation, Equilibrium, Cant and cant deficiency, various curves, speed on curves. Types locations, general equipments, layouts, marshalling yards. Definition, layout details, design of simple turnouts. Types of signals in stations and yards, principles of signaling and inter-locking.

Unit – III : Bridge Site Investigation and Planning ; Loading Standards & Component parts : Selection of site, alignment, collection of bridge design data : essential surveys, hydraulic design, scour depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges : Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges. Bridge super structure and sub-structures, abutments, piers, wing walls, return walls, approaches, floors & flooring system, choice of super structure.

Unit – IV : Bridge Foundations, Construction, Testing and Strengthening of Bridges : Different types of foundation : piles and wells, sinking of wells, coffer-dams. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams, Erection of bridges, girders, equipments and plants, inspection and data collection, strengthening of bridges, Bridge failure.

Unit – V : Tunnels :

1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts.
2. Construction of tunnels in soft soil, hard soil and rock. Different types of lining, methods of lining. Mucking operation, Drainage and ventilation. Examples of existing important tunnels in India and abroad.

Reference Books :

1. Railway Engineering by S.C. Rangwala – Charotar Pub. House, Anand
2. Railway Engineering by Arora & Saxena – Dhanpat Rai & Sons
3. Principles and Practice of Bridge Engineering by S.P. Bindra-Dhanpat Rai & Sons
4. Railway, Bridges & Tunnels by Dr. S.C. Saxena

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**HYDROLOGY LAB**	CE-21L	Min "D"	Min "D"	5.0

HYDROLOGY LAB

List of Experiments :

1. Rainfall recording using weighing Rain gauge / Tipping bucket Rain gauge.
2. Automated Water level Recording
3. Velocity measurement using digital current meter.
4. Measurement of relative humidity
5. Measurement of wind velocity using Anemometer
6. Evaporation measurement using Pan Evapori meter.
7. Determination of infiltration indices using double ring infiltrometer
8. Measurement of field permeability using insitu Permeameter
9. Study of Thermograph, Hydrograph
10. Study of Automated weather station
11. Study of R.O. System.
12. Study of conductivity meter.

Tutorial Exercises :

1. Computation of Average Rainfall by Thiessen Polygon method
2. Computation of Average Rainfall by Isohytel method.
3. Derivation of unit Hydrograph from flood Hydrograph (stage gauging data)
4. Determination of flood hydrograph using super-imposition method.
5. Determination of flood hydrograph using S –Curve hydrograph method.
6. Determination design discharge using empirical formulae
7. Yield test of well. Determining permeability & transmissibility
8. Study of different aquifers
9. Study of weather station.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**STRUCTURAL DESIGN (RCC) LAB-I**	CE-27L	Min "D"	Min "D"	5.0

STRUCTURAL DESIGN (RCC) LAB – I

List of Experiments :

1. Design of Singly reinforced cantilever beam.
2. Design of continuous beam.
3. Design of fixed slab spanning in one direction.
4. Design of continuous slab.
5. Design of cantilever slab.
6. Design of short column.
7. Design of long column.
8. Design of isolated square footing
9. Design of combined footing
10. Design of staircases with waist slab
11. Design of slabless tread riser staircase.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**TRANSPOTATION ENGINEERING LAB-I**	CE-32L	Min "D"	Min "D"	5.0

TRANSPOTATION ENGINEERING LAB-I

Suggested Exercise :

1. Collection of different types of photographs showing
   a. Various bridge types
   b. Rail tracks
   c. Tunnels
2. Hydraulic design of bridges .
3. Various modern large span bridges : Pre stressed bridges and launching process.
4. Visit of Railway bridges for rehabilitation.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E/PTDC	**CONCRETE LAB**	CE-10L	Min "D"	Min "D"	5.0

CONCRETE LAB

List of Experiments :

Design of High Strength concrete mixes :

1. Design f M 50 concrete mix using fly ash and chemical admixtures.
2. Design of M 50 Concrete mix using fly ash, metakline /Silica fumes and other chemical admixtures.
3. Design of M 50 mix suitable for pumping.