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 : Fourth Branch : Civil Engineering

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
CE-18	Geotechnical Engg - II	3	1	-	10	20	30	70	100	4
CE-28	Geographical Information System	3	1	-	10	20	30	70	100	4
CE-22	Fluid Mechanics - II	3	1	-	10	20	30	70	100	4
CE-25	Structural Analysis - I	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
CE-19L	Geotechnical Engg - II Lab	-	-	2	20	-	20	30	50	2
CE-29L	Geographical Information System Lab	-	-	2	20	-	20	30	50	2
CE-23L	Fluid Mechanics - II Lab	-	-	2	20	-	20	30	50	2
CE-55L	Professional Activity	-	-	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)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	GEOTECHNICAL ENGINEERING - II	CE-18	Min "D"	Min "D"	5.0

GEOTECHNICAL ENGINEERING – II

Unit – I : Shallow Foundations : Type of foundations shallow and deep Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity, Prandtl. Tezaghi Balla, Skempton Meyerhof and Hansan, I.S. code on B.C. Determination of bearing capacity limits of total and differential settlements. Plate load test.

Unit – II : Deep Foundation : Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae. Pile load test. Settlement of pile group Negative skin friction. Under-reamed piles and their design piles under tension, inclined and lateral load caissons. Well foundation Equilibrium of wells Analysis for stability t. Remedial measures.

Unit – III : Soil Improvement Techniques : Compaction Field and laboratory methods. Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness.

Soil stabilization : Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical-stabilization and stabilization by grouting. Geo-synthetics, types, functions, materials and uses.

Unit – IV : Soil Exploration and Foundations on Expansive and Collapsible soils : Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them.

Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

Unit – V : Sheet piles/Bulkheads and Machine foundation : Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications.

Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design Design of block foundation for impact type of machine.

Reference Books :

1. Soil Mechanics & Foundation Engg. By Dr. K.R. Arora – Std Pub. Delhi
2. Soil Mechanics & Foundation Engg. By B.C. Punmia – Laxmi Pub. Delhi
3. Modern Geotechnical Engg. By Dr. Alam Singh-IBT Publishers Delhi
4. Geotechnical Engg. By C. Venkatramaiah- New Age International Pub Delhi
5. Foundation Engg. By GALeonards Mc Graw Hill Book Co. Inc.

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	GEOGRAPHICAL INFORMATION SYSTEM	CE-28	Min "D"	Min "D"	5.0

GEOGRAPHICAL INFORMATION SYSTEM

Unit-I

Definition of GIS, Maps & GIS, Digital representation of Geographic data, Data quality and data standards, Raster and Vector based data processing, Digital Terrain modeling, Spatial analysis and modeling.

Remote sensing, its terminology, Electro magnetic signatures , Atmospheric window . Active and Passive systems for remote sensing. Remote sensing applications.

Unit-II

Principle of Aerial Photograph, Flight planning, Relief displacement of vertical photographs. Stereoscope, Parallax bar , methods of aerial photo visual interpretation keys by this instrument.

Unit- III

Principle of Satellite image procurement, spectral reflectance curves, spatial, spectral, temporal, radiometric resolution characteristics of images. Errors of satellite images & their rectification. methods of visual interpretation of satellite images.

Unit - IV

Projection, different types of projections and applications in image correction. projection used in India. measure of shortest distance between two points on the Earth.

Unit - V

Remote Sensing , Technique used in Resource management (Soil, Water,) & Data Base Management system (Urban & Rural Planning) for Civil Engineering Projects. Global positioning system.

Reference Books :

1. Concept and Principle of Geographical Information system by: W.Yeung
2. Principle of Remote Sensing by Sabins
3. Manual of Remote Sensing by (A.S.R.S.) U.S.A.

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	**FLUID MECHANICS - II**	CE-22	Min "D"	Min "D"	5.0

FLUID MECHANICS – II

Unit – I : Turbulent Flow : Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically smooth and rough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes commercial pipes, aging of pipes.

Pipe flow problems : Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes.

Pipe Network : Water Hammer (only quick closure case) transmission of power. *Hardy Cross Method

Unit – II : Uniform flow in open channels : Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow and its computations, uniform flow and its computations, Chezy's and Manning's formulae, determination of normal depth and velocity. Normal and critical slopes, Economical sections,

Unit – III : Non uniform flow in open channels : Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, Saint Venant equation for gradually varied unsteady flow.

Rapidly varied flow – hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume.

Unit – IV : Fluid Machines : Turbines : Classifications, definitions, similarity laws, specific speed and unit quantities, Pelton turbine-their construction and settings, speed regulation, dimensions of various elements, Action of jet, torque, power and efficiency for ideal case, characteristic curves, reaction turbines, construction & settings, draft tube theory, runaway speed, simple theory of design and characteristic curves, Cavitation.

Unit – V : Fluid Machines : Centrifugal pumps : Various types and their important components, manometric head, total head, net positive suction head specific speed, shut of head, energy losses cavitation, principle of working and characteristic curves.

Reciprocating Pumps : Principle of working, Coefficient of discharge, slip single acting and double acting pump, Manometric head, Acceleration head.

Forces on immersed bodies : Types of drag, drag on a sphere, flat plate, cylinder and an aerofoil development of lift, lifting vanes, magnus effect.

Reference Books :

1. Fluid Mechanics by Modi & Seth Standard Book House Delhi
2. Fluid Mechanics by A.K.Jain –Khanna Publishers, Delhi

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	**STRUCTURAL ANALYSIS – I**	CE-25	Min "D"	Min "D"	5.0

STRUCTURAL ANALYSIS – I

Unit – I : Static and kinematics indeterminacy ,Virtual work and Energy Principles : Principles of Virtual work applied to deformable bodies, strain energy and complementary energy. Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.

Unit – II : Indeterminate structures –I :. Analysis of Fixed and continuous beams by theorem of three moments. Effect of sinking and rotation of supports, Moment distribution method (without sway)

Unit – III : Indeterminate Structures – II : Analysis of beams and frames by slope deflection method. Column Analogy method.

Unit – IV : Arches and Suspension Cables : Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches – Rib shortening and temperature effects.

Unit – V : Rolling loads and influence Lines : Maximum SF and BM curves for various types of Rolling loads, focal length EUDL, Influence Lines for Determinate Structures – Beams, Three Hinged Arches.

Reference Books :

1. Wang C.K. Intermediate Structural Analysis, Mc Graw Hill New York.
2. Kinney Streling J Indeterminate Structural Analysis Addison wasley
3. Reddy C S Basic Structural Analysis Tata Mc Graw Hill Pub. Co. New Delhi

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	**GEOTECHNICAL ENGINEERING – II LAB**	CE-19L	Min "D"	Min "D"	5.0

GEOTECHNICAL ENGINEERING – II LAB

List of Experiments :

1. The Unconfined Compression Test
2. Tri-axial Compression Test
3. Vane Shear test
4. CBR Test
5. Plate Load Test
6. Standard Penetration Test
7. Dynamic Cone Penetration Test
8. Free Swelling Index and Differential Free swell Test
9. Swelling Pressure Test
10. Consolidation Test

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	GEOGRAPHICAL INFORMATION SYSTEM LAB	CE-29L	Min "D"	Min "D"	5.0

GEOGRAPHICAL INFORMATION SYSTEM LAB

List of Experiments :

1. An Exercise on Geographic phenomenon and computer representations.
2. An Exercise on Tabular data and basic queries
3. An Exercise on spatial referencing
4. An Exercise on Data entry and editing
5. An Exercise on Point data interpolation
6. An Exercise on Spatial queries
7. An Exercise on Spatial analysis with vector data
8. An Exercise on Spatial analysis with raster data
9. An Exercise on Spatial data visualization
10. An Exercise on data input/output
11. An Exercise on Vector query exercise
12. An Exercise on Map edit
13. An Exercise on Terrain and Tin interpolation
14. An Exercise on Raster analysis
15. An Exercise on Statistics module data information
16. An Exercise on Image processing
17. An Exercise on Image Enhancement, Image Transformation
18. An Exercise on Layout vector and Raster
19. An Exercise on Classification Supervised and unsupervised.

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	**FLUID MECHANICS - II LAB**	CE-23L	Min "D"	Min "D"	5.0

FLUID MECHANICS - II LAB

List of Experiments :

1. Study the performances characteristics of Pelton Wheel.
2. Study the performances characteristics of Francis Turbine
3. Study the performances characteristics of Kaplan Turbine
4. Calibration of multistage (Two) Pump & study of Characteristics of variable speed pump
5. To Study the performances & details of operation of Hydraulic Ram.
6. Determination of coefficient of discharge for a broad crested wear & to plot water surface profile over the weir.
7. Study the characteristics of Reciprocating pump.
8. Study of Critical, Sub Critical and Super Critical Open Channel flows
9. Study of Hydraulic jump in an Open Channel
10. Study of Open Channel Surges
11. Study of Cavitation phenomenon
12. Study of Boundary Layer over a flat plate in a Wind Tunnel
13. Study of Drag and Lift over an Aerofoil

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

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE/PTDC	**PROFESSIONAL ACTIVITY**	CE-55L	Min "D"	Min "D"	5.0

PROFESSIONAL ACTIVITY
(Suggested Exercise)

- Student shall visit a nearby Industry and shall prepare a technical report suggesting some improvement in operation.
- Student shall Design and fabricate a new laboratory equipment. He shall prepare a design report.
- Student shall improve an existing lab equipment and prepare chart or lab manual .
- Student shall publish a review paper in some Indian Journal.
- Student shall make a report on an Industry employing latest technology/ Innovation.
- Student shall prepare a working model of a machine part.
- Student shall make a software/ comp. program for the Institute to enhance efficiency in its working.
- Student shall prepare a detailed project report to start a small-medium enterprise.
- A group of student shall register with the Industry cell and submit a report on work done there about Institute-Industry linkage.
- Experimental work on a new set of equipments.
- Seminar Presentation with a report submitted to the supervisor.

Study of following I.S. Codes used in Civil Engineering :

1. IS 456 : 2000 – Plain and reinforced concrete
2. IS 800 : 2007 – General construction in steel
3. 875 (Part 1-5) : 1987 – Code of practice for design loads (other than EQ) for buildings & structures
4. 1893 : 2002 – Criteria for earthquake resistant design of structures
5. SP 16 : 1980 – Design aids (for reinforced concrete IS 456 : 1978)

6. SP 24 : 1983 – Explanatory Handbook on IS 456:1978
7. SP 34 : 1987 – Handbook on concrete reinforcement and detailing
8. SP 23 : 1982 – Design of concrete mixes
9. 13920 : 1993 – Ductile detailing of reinforced concrete structures subjected to seismic forces.
10. IS 2720 : (in different parts) Soil testing
11. IS 1498 : 1970 – Classification & identification of soil
12. IRC 37 : 1984 –Guidelines for design of flexible pavements.
13. IS 2911 : – (Different parts) – Pile foundation
14. IS 269 : 1989 – C-33 OPC Grades

    IS 8112 : 1989 – C-43 OPC Grades

    IS 12269 : 1987 – C-53 OPC Grades
15. IS 1489 : 1991 – PPC
16. IS 383 : 1970 – Specification for course & fine aggregate from natural sources for concrete
17. IS 2386 : – (part 1-8) Methods of tests for concrete aggregates
18. IS 4926 : 1976 – Ready Mix Concrete
19. IS 10262 : 1982 – Concrete mix design
20. IS 226 : 1975 – Structural Steel
21. SP : 20 – Rural Road Manual

Note : The list of activities can be modified as per requirements of the department.
A hand written report of about 30 pages duly signed by the student and the concerned teacher should be submitted.