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)

B.E. Second Year **Branch : Civil** **Sem : Fourth**

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
					SESSIONAL EXAM			ESE	SUB TOTAL	
		L	T	P	TA	CT	TOTAL			
CH-03	Energy Ecology Environment & Society	3	1	-	10	20	30	70	100	4
CE-14	Surveying	3	1	-	10	20	30	70	100	4
MA-04	Numerical Computation	3	1	-	10	20	30	70	100	4
CE-16	Geotechnical Engineering - I	3	1	-	10	20	30	70	100	4
ME-10	Fluid Mechanics - I	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
CE-15L	Surveying Lab	-	-	2	20	-	20	30	50	2
MA-05L	Numerical Computation Lab	-	-	2	20	-	20	30	50	2
CE-17L	Geotechnical Engineering Lab - I	-	-	2	20	-	20	30	50	2
ME-11L	Fluid Mechanics Lab - I	-	-	2	20	-	20	30	50	2
CE-55L	Professional Activity	-	-	2	50	-	50	-	50	2
CE-58L	Seminar/Group Discussion	-	-	2	50	-	50	-	50	2
	Total	**15**	**5**	**12**	**230**	**100**	**330**	**470**	**800**	**32**

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total Marks 800 Total Periods : 32, Total Credits : 32

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	
COMMON TO B.E	**ENERGY ECOLOGY ENVIRONMENT & SOCIETY**	CH03	Min "D"	Min "D"	5.0

ENERGY ECOLOGY ENVIRONMENT & SOCIETY

Unit I : **Energy sources and energy storing devices**

World and Indian energy scenario, types of energy sources – renewable and non-renewable energy sources. Solar energy storage ,application & maintenance of solar cell panel, introduction & applications of hydro, wind, biomass, ocean, tidal, wave and geothermal. Synergy between energy and environment. Global environment issues, greenhouse gas emission, global warming, green energy solution.

Batteries – Primary and Secondary batteries- Alkaline battery – Lead (Pb) acid storage battery , Ni-cadmium battery ,Lithium battery ,Fuel cell , Hydrogen Oxygen fuel cell ,Photo galvanic cell.

Unit II : Ecosystem Structure & scope of ecology, Natural cycles of the environment, Hydrogen cycle, Oxygen Cycle, Carbon cycle, Nitrogen cycle, Phosphate cycle, Sulphur cycle, Biodiversity.

Society:- Environmental problems and impact of P.A.T(Population, Affluence and Technology). Environmentally beneficial and harmful technologies, environment impact assessment policies (EIA).Ethics and regulatory act of environment.

Soil Pollution Sources & control measures. MSW, HWM.

Unit III : **Air pollution-** Chemical composition of atmosphere, -primary, Secondary; pollutants, Chemical and photochemical reaction, effects of CO, SOx, NOx, HC and particulates. Causes & effects of acid rain, ozone depletion: Monitoring and control of air pollutants.

Noise pollution- introduction physiological effect, measurement and control of noise pollutants.

Unit IV : Water pollution- sources causes of water pollution , types and nature of water pollutant. Pollution load determination i.e. particulates ,suspended matter, total dissolved solids ,dissolved gases DO, BOD & COD. EL NINO phenomenon. Waste water treatment

Domestic – Aerobic & anaerobic treatment. Industrial waste water treatment (ETP plant.) Electro dialysis membrane technique and filtration by activated charcoal and synthetic resins.

Unite V : Corrosion & its prevention- Theories of Corrosion and Mechanism – Dry (Direct Chemical attack), Wet (Electro Chemical Theory) Atmospheric corrosion, Galvanic Series, Galvanic & Concentration Cell Corrosion, Corrosion by sea water. Factors Influencing & control of Corrosion – Proper Design, Use of pure metal and metal alloys, passivity, cathodes protection – Sacrificial anode and Impressed Current. Modifying the environment, Use of inhibitors.

TEXT BOOKS

1. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi
2. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.
3. A text book of Environmental Chemistry and Pollution control by S.S. Dara & Dr. D. D. Mishra, S. Chand & Co, New Delhi
4. Energy,Environment Ecology and Society by Dr.Pushpendra,Vayu Education of India New Delhi .
5 Energy, Environment Ethics and Society, by Dr.S.Deswal & Dr.A.Deswal Dhanpat Rai Publishing Company, New Delhi

REFERENCE BOOKS

1. J.C. Kuriakose and J. Rajaram, "Chemistry in Engineering and Technology", Vol.1 & 2, Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi
2. Mars G. Fontana, "Corrosion Engineering", Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi.
3. F.Chau, Y. Liang, J. Gao and X. Shao, "Chemometrics", Wiley Inter Science.

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	
B.E/PTDC	**SURVEYING**	CE-14	Min "D"	Min "D"	5.0

SURVEYING

Unit – I

Reciprocal leveling, profile leveling, cross sectioning, contouring, methods of contouring trignometrical leveling.

Unit – II

Traversing by theodolite, field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting and adjusting of traverse, omitted measurements.

Unit – III

Tacheometry : Tacheometric systems and principles, stadia system, uses of anallatic lens, tangential system, subtense system, instrument constant field work, reduction, direct reading tacheometers, use of tacheometry for traversing and contouring.

Unit – IV

Curves : Classification and use; element of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscates, vertical curves setting out.

Unit – V

Control Surveys : Providing frame work of control points, triangulation principle,reconnaissance selection and marking of stations.
Hydrographic Surveying : Sounding, methods of observations, computations and plotting.
Field Astronomy : Spherical trigonometry, Astronomical terms, co-ordinate systems circumpolar stars, astronomical triangle determination of Azimuth & time.

Book References :

1. Surveying & Levelling Vol.I & Vol II T.P. Kanetkar
2. Guggal, Surveying Theory & Practice, Vol.I& II,Tata McGraw Hell Pub co.ltd.
3. Surveying Vol I,II,& III B.C. Punamia
4. Surveying Vol I,II, KR.Arora

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	
CE B.E/PTDC	**NUMERICAL COMPUTATION**	MA04	Min "D"	Min "D"	5.0

NUMERICAL COMPUTATION

Unit -1 Introduction of operation Research, LPP formulation, Graphical method for solving LPP simplex method, Two phase method, Big –M Method, Duality theory, Dual Simplex method.

Unit – II Transportation problems : Introduction, initial basic feasible solution, optimality test, degeneracy in Transportation problem.

Assignment problem : Introduction, Mathematical formulation of an assignment problem, solution of assignment problems.

Dynamic programming : Basic concepts, bellman's optimality principles, dynamic programming approach in decision making problems.

Unit-III Numerical solution of PDE :Classification, Finite –difference approximation to derivatives, solution of Laplace's equation by Jecobi's and Gauss Seidel method, parabolic equation, Iterative method for the solution of equations, Hyperbolic equation and its numerical solution.

Unit-IV Finite elements methods- I : Functionals, Euler's equation, variational form, Isoperimetric problem, Functional evolving higher order derivatives, Approximate solution of boundary value problem by Rayleigh- Ritz method and Weighted residual method (Galerkin's method).

Unit- V Finite element methods – II-Application of Rayleigh- Ritz and Galerkin's method to two dimensional problems (poison's equation and equation of heat conduction), finite element Application for one dimensional problems and two dimensional problems.

References Books –

1. Taha H.A,' Operation Research, PHI.
2. Hiller and Lieberman, Introduction to OR TMH.
3. S.S. Sastry, Introductory methods of Numerical Analysis.
4. J.N. Reddy, Finite element methods TMH.
5. O.C. Zienkiewicz, The finite element method.

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	
B.E/PTDC	**GEOTECHNICAL ENGINEERING – I**	CE16	Min "D"	Min "D"	5.0

GEOTECHNICAL ENGINEERING – I

Unit – I : Basic Definitions & Index Properties : Definition and scope of soil mechanics, Historical development. Formation of soils. Soil composition. Minerals, Influence of clay minerals on engineering behavior, Soil structure. Three phase system. Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits.

Unit – II : Soil Water and Consolidation : Soil water, Permeability Determination of permeability in laboratory and in field. Seepage and seepage pressure. Flownets, sues of a flownet, Effective, neutral and total stresses.

Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of preconsolidation pressure, settlement analysis. Calculation of total settlement.

Unit – III : Stress Distribution in Soils and Shear Strength of Soils : Stress distribution beneath loaded areas by Boussinesq and water guard's analysis. Newmark's influence chart. Contact pressure distribution.

Mohr-Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test. Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

Unit – IV : Stability of Slopes : Infinite and finite slopes**.** Types of slope failures, Rotational slips. Stability number. Effect of ground water, selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis. Stability of Earth Dams.

Unit – V : Lateral Earth Pressure : Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Analytical and graphical methods of determination of earth pressures on cohesion – less and cohesive soils. Effect of surcharge, water table and wallfriction. Arching in soils. Reinforced earth retaining walls.

Reference Books :

1. Soil Mech. & Found. Engg. By Dr. K.R. Arora – Std Publishers Delhi.
2. Soil Mech. & Found by Dr. B.C.Punmia – Laxmi Publications, Delhi
3. Modern Geotech Engg. By Dr. I Aram Singh – IBT Publishers Delhi
4. Geotech Engg. By C.Venkatramaiah New Age International Publishers, Delhi
5. Soil Mech & Found. Engg. By S.K. Garg – Khanna Publishers, Delhi
6. Soil Testing for Engg. By T.W. Lambe – John Wiley & Soms. Inc.
7. Relevant I.S. Codes

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
			L	T	
BE CE/IP/MECH	**FLUID MECHANICS-I**	**ME-10**	Min "D"	Min "D"	**5.0**

FLUID MECHANICS-I

Unit-I: Review of Fluid Properties: Engineering units of measurement, mass, density, specific weight, volume and gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure. Fluid Static's : Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems on gravity dams and tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit-II : Kinematics of Flow : Types of flow-ideal & real , steady & unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streak-lines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow nets their utility & method of drawing flow nets.

Unit-III : Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow, momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications.
Flow Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.), flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venture-meter, weirs and notches).

Unit-IV : Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, rotodynamic machines etc.)

Unit-V : Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles.

References:

1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas; Fluid Mechnics and machinery; TMH
3. Cengal; Fluid Mechanics; TMH
4. White ; Fluid Mechanics ; TMH
5. JNIK DAKE; Essential of Engg Hyd; Afrikan Network & Sc Instt. (ANSTI)
6. Franiss JRD; A Text Book of fluid Mech. for Engg. Student
7. R Mohanty; Fluid Mechanics; PHI
8. Gupta; Fluid Mechanics; Pearson.

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	
B.E/PTDC	**SURVEYING LAB**	CE-15L	Min "D"	Min "D"	5.0

SURVEYING LAB
(Suggested Exercise)

1. Theodolite Traversing.
2. Profile leveling, contouring & cross sectioning
3. Curve setting by different methods.
4. Determination of tachometric constants & uses of tacheometer in various field works.
5. Field exercises using EDM
6. Electronic total station.

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	
CE B.E/PTDC	**NUMERICAL COMPUTATION LAB**	MA-05L	Min "D"	Min "D"	5.0

(Suggested Exercise)

1. Development of algorithm for a problem on optimization & solution by computer.
2. Development of algorithm for a problem requiring dynamic programming of optimization & solution by computer.
3. Numerical solution of partial differential equation & its solution by computer.
4. Development of algorithm using finite element method for one dimensional, two dimensional differential equation
5. Solution of FEM problem using computer.

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	
B.E/PTDC	**GEOTECHNICAL ENGINEERING LAB-I**	CE-17L	Min "D"	Min "D"	5.0

GEOTECH ENGINEERING LAB-I
(Suggested Exercise)

List of Experiments :

1. Determination of Hygroscopic water content
2. Determination of field density by Core Cutter method.
3. Determination of field density by Sand Replacement method.
4. Determination of field density by Water Replacement method
5. Particle – size analysis
6. Determination of Specific gravity of soil particles
7. Determination of plastic limit
8. Determination of liquid limit
9. Determination of shrinkage limit
10. Permeability test
11. Light Compaction Test (Std. Compaction Test)
12. Heavy Compaction Test (Modifies Compaction 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	
B.E/PTDC IP/ME/CE	**FLUID MECHANICS LAB-I**	ME-11L	Min "D"	Min "D"	5.0

List of Experiment (Expandable) :

1. To determine the local point velocity with the help of pitot tube.
2. To find out the terminal velocity of **a** spherical body in water.
3. Calibration of Orifice meter and Venturi meter
4. Determination of Cc, C_v, C_d of Orifices
5. Calibration of Nozzle meter and Mouth Piece
6. Reynolds experiment for demonstration of stream lines & turbulent flow
7. Determination of meta-centric height
8. Determination of Friction Factor of a pipe
9. To study the characteristics of a centrifugal pump.
10. Verification of Impulse momentum principle.

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	
B.E/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.

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	
B.E/PTDC	**SEMINAR/GROUP DISCUSSION**	CE-58L	Min "D"	Min "D"	5.0

Objectives of Group Discussion & Seminar is to improve the Mass Communication and Convincing/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.