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 : Third Branch : Civil Engineering

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
MA-03	Mathematics- III	3	1	-	10	20	30	70	100	4
ME-10	Fluid Mechanics - I	3	1	-	10	20	30	70	100	4
CE-16	Geotechnical Engg -I	3	1	-	10	20	30	70	100	4
MA-04	Numerical Computation	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
ME-11L	Fluid Mech.Lab - I	-	-	2	20	-	20	30	50	2
CE-17L	Geotechnical Engg -I Lab	-	-	2	20	-	20	30	50	2
MA-05L	Numerical Computation Lab	-	-	2	20	-	20	30	50	2
CE-54L	Professional Activity -II	-	-	2	20	-	20	30	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

Dr. SHAILJA SHUKLA
DEAN
Academics
Jabalpur Engineering College
Jabalpur - 482 011 (M.P.)

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	
	MATHEMATICS- III	MA03	Min "D"	Min "D"	5.0

MATHEMATICS – III

Unit – I : Fourier Series : Conditions for a fourier expansion, having finite number of discontinuities, change of interval and half- rang series.

Laplace transform and inverse Laplace transform of simple functions, their elementary properties and application in solution of ordinary differential equations.

Unit – II : Analytic functions, Harmonic conjugates, Cauchy-Reimann equations, line integral, cauchy's theorem, Cauchy's integral formula, poles, residues, Residues theorem, evaluation of real integral, Bilinear transformation.

Unit – III : Difference operators, errors and approximation, interpolation (Newtons interpolation formulae, Central interpolation formulae, Lagranges interpolation, Newtons divided difference interpolation – formula inverse interpolation.

Numerical differentiation, maxima and minima.

Unit – IV : Numerical integration by using simpson's method, weddels rule, Gauss-Legendre open quadrature formula.

Solution of algebraic and transcendental equations by using Regula-Falsi, Newton-Rephson, iterative, Graffes root squaring method, Bairstow's method.

Unit – V : Solution of simultaneous algebraic equatins by using gauss elimination, Gauss-Jorden, Crout's jacobbi iterative, Gauss-siedal, Relaxation methods.

Solution of ordinary differential equations (Taylor series, Picard's Modified Euller method, Runge-kutta, predictor corrector method.)

References :

1. Laplace transform, by R.V. Churchill
2. Higher Engineering Mathematics by B.V Ramanna, TMH
3. Advanced Engineering Mathematics by Kreysizig E, willey Eastern Limited.
4. Introductory Methods of Numerical Analysis by S.S. Sastry
5. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.

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			T	P	
	FLUID MECHANICS-I	ME10	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

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. **Fluid Measurements**: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturi-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

References: -

1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi
2. Streeter VL, Wylie EB, Bedford KW; Fluid Mechanics; TMH
3. Som and Biswas; Fluid Mechnics and machinery; TMH
4. Cengal; Fluid Mechanics; TMH
5. White ; Fluid Mechanics ; TMH
6. Gupta; Fluid Mechanics; Pearson
7. JNIK DAKE; Essential of Engg Hyd; Afrikan Network & Sc Instt.-(ANSTI)
8. R Mohanty; Fluid Mechanics; PHI

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			T	P	
B.E.	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

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			T	P	
B.E.	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.

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	FLUID MECHANICS LAB-I	ME11L	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.

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B.E.	GEOTECH ENGINEERING LAB-I	CE17L	Min "D"	Min "D"	5.0

GEOTECH ENGINEERING LAB-I
(Suggested Exercise)

List of Experiments :

1. Determination of Hygroscopic water content.
2. Particle – size analysis
3. Determination of Specific gravity of soil particles
4. Determination of plastic limit
5. Determination of liquid limit
6. Determination of shrinkage limit
7. Permeability tests
8. Direct shear test
9. Consolidation test.

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			T	P	
B.E.	NUMERICAL COMPUTATION LAB	MA05L	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.

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B.E.	PROFESSIONAL ACTIVITY -II	CE54L	Min "D"	Min "D"	5.0

PROFESSIONAL ACTIVITY- II
(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.

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.

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