Jabalpur Engineering College, Jabalpur

Semester IV Credit Based Grading System (CBGS) w.e.f. July 2017

Scheme of Examination

Bachelor of Engineering B.E. (Civil Engineering)

Subject wise distribution of marks and corresponding credits

Scheme of Examination w.e.f. July-2017 (Academic Session-2017-18)

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Hours / week.			Total Credits	Total Marks
			Theory			Practical		Total Marks					
			End Sem	Mid Sem. MST	Quiz, Assign ment	End Sem.	Lab Work		L	T	P		
1	**MA4101**	Mathematics-III	70	20	10	-	-	100	3	1	-	4	
2	**CE4002**	Fluid Mechanics-I	70	20	10	30	20	150	3	1	2	6	
3	**CE4003**	Geotechnical Engg.-1	70	20	10	30	20	150	3	1	2	6	
4	**CE4004**	Advance Surveying	70	20	10	30	20	150	3	1	2	6	
5	**CE4005**	Transportation Engg.-1	70	20	10	-	-	100	3	1	-	4	
6	**CE4006**	Building Materials Testing Lab (Departmental Lab-I)	-	-	-	30	20	50	-	-	2	2	
7	**CE4007**	Numerical Computation Lab (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
8	**CE4008**	Professional Ethics/ Security and regulation act (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
Total			**350**	**100**	**50**	**120**	**180**	**800**	**15**	**5**	**12**	**32**	**800**

MST: Minimum of two mid semester tests to be conducted. **L: Lecture** **T: Tutorial** **P: Practical**

- **Students have to go for Industrial Training /Internship of 4 weeks at the end of IV Semester.**

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B.E. (CBGS) IV SEMESTER
CIVIL ENGINERRING
MATHEMATICS- III

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Mathematics- III	MA4101	Min. "D"	Min. "D"	5.0

Unit-I:

Analytic functions, Cauchy- Riemann equations in Cartesian and polar coordinates, harmonic and conjugate harmonic functions, Complex integration, line integral, Cauchy's integral theorem, Cauchy integral formula.

Unit –II:

Residue theorem, evaluation of simple real integrals, Taylors and Laurent series, Conformal mappings, mappings of elementary functions, Bilinear transformations, Jock vow ski's transformation, Schwarz – Christ of fel transformation.

Unit –III:

Roots of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton-Raphson method, iteration method, Graffes root squaring method. Solution of system of linear equations: Gauss elimination method, Gauss Jordan method, LU decomposition method, relaxation method, Jacobi and Gauss-Seidel methods.

Unit –IV:

Interpolation: Finite difference operator and their relationships, difference tables, Newton, Gauss, Bessel and Stirling's interpolation formulae, Divided differences, Lagrange Interpolation and Newton's divided difference interpolation.Numerical differentiation and Integration: First and second order derivatives by various interpolation formulae, Trapezoidal, Simpsons 1/3rd and 3/8th rules with errors and their combinations, Gauss Legendre 2-points and 3-points formulae.

Unit –V:

Numerical Solution of ordinary differential equations: Solution of ODE by Taylor series, Picard's method, Modified Euller method, Runge-kutta Method, predictor corrector method.Sampling: Brief idea of sampling, t, F and χ^2 distribution and their applications, ANOVA, Statistical quality control, control charts, sampling inspection, acceptance sampling, Producers and consumers risk, O.C. curve, Taguchi method.

Reference Books:

1. Advanced Engineering Mathematics by E. Kreyszig John Willey & Sons
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Numerical Methods in Engineering and science by B.S. Grewal, Khanna Publishers .
4. Higher Engineering Mathematics by B.V. Ramana TMH.
5. Numerical Methods by E. Balagurusamy, Tata Mc Graw- Hill Publishing CompanyLtd., New Delhi.

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B.E. (CBGS) IV SEMESTER
CIVIL ENGINERRING
FLUID MECHANICS-I

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Fluid Mechanics-I	CE4002	Min. "D"	Min. "D"	5.0

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 Statics : 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 vans and other applications.

Flow 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, laminar flow through porous media, Stoke's law, lubrication principles.

Books 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.

FLUID MECHANICS-I LAB

List of Experiment:

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, Cr, Co 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. (CBGS) IV SEMESTER
CIVIL ENGINERRING
GEOTECHNICAL ENGINEERING – I

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Geotechnical Engineering – I	CE4003	Min. "D"	Min. "D"	5.0

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, uses of a flownet, Effective, neutral and total stresses. Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Time fitting curves. Normal 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 wester gaard'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. Vane 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.

Books Reference :

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

GEOTECHNICAL ENGINEERING – I LAB

List of Experiment: (Suggested Exercise)

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 (Modified Compaction Test)

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B.E. (CBGS) IV SEMESTER
CIVIL ENGINERRING
ADVANCE SURVEYING

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Advance Surveying	CE4004	Min. "D"	Min. "D"	5.0

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:

Tachometry : Tachometric 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, setting out vertical curves.

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

ADVANCE SURVEYING LAB

List of Experiment:

1. Theodolite Traversing.
2. Profile levelling, 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.

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B.E. (CBGS) IV SEMESTER
CIVIL ENGINERRING
TRANSPORTATION ENGINEERING – I

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Transportation Engineering –I	CE4005	Min. "D"	Min. "D"	5.0

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 comparis on, requirement of a good sleeper, sleeper density.
3. **Rail fastenings:** types, Fish plates, fish bolts, spikes, bearing plates, chain keys, 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.

Books Reference :

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

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B.E. (CBGS) IV SEMESTER
CIVIL ENGINERRING
BUILDING MATERIALS TESTING LAB (DEPARTMENTAL LAB-I)

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Building Materials Testing Lab (Departmental Lab-I)	CE4006	Min. "D"	Min. "D"	5.0

List of Experiment:
(Suggested Exercise)

Test as per I.S.I. and other experiments based on the syllabus.

1. Tests on Bricks (conduct all the tests on a brick sample)
2. Conduct all the tests on cement sample.
3. Conduct all the tests on a coarse aggregates sample.
4. Conduct all the tests on fine aggregates sample.
5. Conduct tests on fresh concrete.
6. Design of concrete mixed Ml5, M20, M25, M30
7. Design of concrete mixed M40, M50, M60 with the help of suitable super plasticizer and Chemical admixture.
8. Conduct on all test on reinforcing bars.
9. Study of Non-destructive testing equipments.

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