National Institute of Technology, Raipur (C.G.)

Course of Study & Scheme of Examination | B. Tech. III Semester | Branch : Civil Engineering

S.No.	Board of Studies	Sub.Code	Subject Name	Periods/week			Examination Scheme					Total Marks	Credits L+(T+P)/2
				L	T	P	TA	FE	SE	T.C.A.	ESE		
1	Applied Mathematics	CE-311	Mathematics III	3	1	-	20	15	15	50	70	120	4
2	Civil	CE-312	Fluid Mechanics I	3	1	-	20	15	15	50	70	120	4
3	Civil	CE-313	Surveying I	3	1	-	20	15	15	50	70	120	4
4	Civil	CE-314	Building Materials	3	1	-	20	15	15	50	70	120	4
5	Civil	CE-315	Engineering Geology	3	1	-	20	15	15	50	70	120	4
6	Civil	CE-316	Mechanics of Solids	4	1	-	20	15	15	50	70	120	5
7	Civil	CE-322	Fluid Mechanics I Lab	-	-	3	30	-	-	30	20	50	2
8	Civil	CE-323	Surveying I Lab	-	-	3	30	-	-	30	20	50	2
9	Civil	CE-326	Materials Testing Lab	-	-	3	30	-	-	30	20	50	2
10	Humanities	CE-327	Value Education	-	-	2	25	-	-	25	0	25	1
11	Civil	CE-328	Discipline	-	-	-	25	-	-	25	0	25	1
			Total	19	6	11	260	90	90	440	480	920	33

Note : For attendance of a student in every theory and practical class, the teachers are supposed to keep records ultimately in the following format which will be included in the semester mark-sheets.

T.C.A. = Total of Continuous Assessment.

Format for attendance

Attendance						Category
> 85					----- >	High "H"
> 70 & < 85					----- >	Medium "M"
> 60 & < 70					----- >	Low "L"
< 60					----- >	Poor "P"

National Institute of Technology Raipur (CG)
Civil Engineering Department
Third Semester

Fluid Mechanics-I Code: CE- 312

Total Theory Periods per Week: 3 Total Tutorial Periods per Weeks: 1 Total Marks: 120

Teacher's Assessment: 20 First Examination: 15 Second Examination: 15 End Semester Examination: 70

Unit 1 INTRODUCTION: Fluid and continuum, physical properties of fluids ideal and real fluid, Newtonian and Non-Newtonian Fluid

Fluid Statics: Pressure density height relationship, pressure measurement by Manometers, Pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, metacentric height, fluid mass subjected to uniform accelerations.

Kinematics of fluid flow: Steady and unsteady flow, uniform and non uniform flow, laminar and turbulent flow, one, two and three dimensional flow, streamlines, streak lines and path lines, circulation and vorticity, rotational and irrotational flow, velocity potential and stream function, graphical and experimental methods of drawing flow nets, continuity equation.

Unit 2 : Dynamics of fluid flow

Euler's equation of motion along a streamline and its integration, Navier Stroke Equation, Bernoulli's equation and its applications - Pitot tube, Venturimeter, orificemeter, nozzles, momentum equation and its application to stationary and moving plates/vanes, impact of jets, pipe bends, problems related to combined application of energy and momentum equations.

Unit 3: Flow in Pipes

Reynold's experiment, experimental determination of critical velocity, transition from laminar to turbulent flow, concept of equivalent length, pipes in series and parallel, analysis of pipe network (Hardy-Cross method), minor losses in pipe lines, loss due to sudden contraction, expansion, etc; Hot wire anemometer and LDA.

Unit 4: Flow in open Channel

Comparison between open channel and pipe flow, definition of uniform and non-uniform flow, uniform flow formulae, Chezy's and Manning's Formula, Hydraulically efficient channel section of rectangular, trapezoidal and circular type, Economical Sections, Compound Sections.

Unit 5: Flow through mouthpieces and orifices

Hydraulic coefficients of orifice, bell method orifice, mouthpieces, Borda's mouthpieces, running free and submerged.

Notches and Weirs: Rectangular, triangular and trapezoidal notches and weir, cippoletti and broad crested weir, aeration of nappe, cavitations submerged weir.

Name of Text Books:

Fluid Mechanics and Machines - Dr. A.K. Jain (Khanna Publications) Fluid Mechanics and Machines - Dr. R.K. Bansal (Laxmi Publications)

Name of Reference Books:

Fluid Mechanics - Dr. P.N. Modi (Standard Book House) Mechanics of Fluid - Irving H. Shames (McGraw Hill) Introduction to Fluid Mechanics - James A. Fay (Prentice Hall India) Fluid Mechanics - R.J. Garde (New Age International Publication) Fluid Mechanics - Streeter V.L. & Wylie E.B. (Tata McGraw Hills) Fluid Mechanics - John F Dougles (Pearson Publication)

National Institute of Technology Raipur (CG)
Civil Engineering Department
Third Semester

Surveying-I Code: CE- 313

Total Theory Periods per Week: 3 Total Tutorial Periods per Weeks: 1 Total Marks: 120

Teacher's Assessment: 20 First Examination: 15 Second Examination: 15 End Semester Examination: 70

Unit 1 Leveling

Different methods of determining elevations: Spirit, Trigometric, Barometric and Photogrammetric methods, Spirit leveling-Definitions of terms, Principle, Construction, Temporary and permanent adjustment of levels. Sensitivity of bubble tube, Automatic levels, Levelling staves, Methods of spirit leveling Booking and reduction of field notes, Curvature and refraction, Reciprocal leveling Plotting of profiles, Barometric leveling, Construction and field use of altimeter, Trigonometric leveling-simple and reciprocal observations, Source of errors and precision of leveling procedures.

Unit 2 Contouring

Direct and Indirect methods of contouring. Interpolation of contours, Drawing section from contour map, Application and Modern methods of depicting relief on a Map.

Unit 3 Thedolite and Traversing

Venire and microptic theodolites, Temporary and permanent adjustments, Requirements of nonadjustable parts, Measure of horizontal and vertical angles by different methods Principle of traversing by theodolite, Field work and checks, Computation of coordinates, Source of errors, Precision of traversing, Checking and adjusting of traverses, Omitted measurements

Unit 4 Plane Table Surveys

Principles, Advantages and disadvantages, Plane table equipment, Use of Telescopic Alidade and Indian Pattern tangent Clinometer, Different methods of Plane Table Surveying, Resection-Two and Three point problems. Fields work in Plane Table Surveying and contouring.

Minor Instruments

Hand level, Abney Level, clinometers, ceylon ghat tracer, Box Sexant, Pentagraph, planimeter, ediograph.

Unit 5 Curves

Classification of curves; Elements of Circular, Transition and Vertical curves, Theory and method of setting out Simple, Transition and Vertical curves. Special field problems.

Name of Text Books:

Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
Surveying (Vol. I & II) – Kanetkar (Pune Vidyarthi Griha Prakashan, Pune)

Name of Reference Books:

Surveying (Vol. II & III) – Agor, R (Khanna publications, Delhi, 1995)
Surveying (Vol. II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
Fundamentals of Surveying – S.K. Roy (Prentice Hall of India)
Surveying (Vol. I & II) – S.K. Duggal (Tata McGraw Hill)

National Institute of Technology Raipur (CG)
Civil Engineering Department
Third Semester

Building Materials Code: CE- 314

Total Theory Periods per Week: 3 Total Tutorial Periods per Weeks: 1 Total Marks: 120

Teacher's Assessment: 20 First Examination: 15 Second Examination: 15 End Semester Examination: 70

Unit 1 – Cement: Introduction, ingredients and function, setting time, Hydration of cement, tests on properties of cement, Types of Cement. Classification of Aggregates (Coarse and Fine) and their properties, tests on aggregates. Classification of Pozzolanas and applications.

Unit 2 – Concrete: Properties of concrete in fresh and hardened state, water cement ratio, Modulus of elasticity, factors affecting strength of concrete and durability, mixing, transporting, placing, compacting and curing concrete, variables in proportioning concrete mixes, admixtures in concrete, tests on concrete, Non destructive testing. High Performance Concrete.

Unit 3 - Special Concrete : Polymer concrete, fibre reinforced concrete, light weight concrete, high strength concrete, heavy weight concrete, green concrete, ready mixed concrete, shotcrete, smart Concrete and ferro cement, Fly ash bricks, hollow cement concrete blocks.

Unit 4 - Timber and Plywood : Characteristics of good timber, defects in timber, density moisture relationship, seasoning and preservation, types and species of structural timber and their suitability,codal provision for design, Types and uses of plywood, veneers and hardboards. Low cost materials for construction – System concepts, cost effective materials, industrial wastes, agricultural wastes, methods needed for propagation of new technologies from laboratory to field.

Unit 5 - Paints, Glass etc. : Commercially available varieties of ceramics, glass and their uses, types of tiles, method of Manufacturing and tests for suitability. Uses of Plastics and PVC. Composition and use of paints, varnishes and distempers. Composite materials, types and applications in construction.

Name of Text Books:

Building Materials – S.K. Duggal (New Age Publication)
Building Materials – S. C. Rangwala (Charotar Publication)

Name of Reference Books:

Concrete Technology – A.M. Neville & J.J. Brooks (Pearson Education)
Concrete Technology – M.S. Shetty (S. Chand & Co.)
Engineering Materials – Surendra Singh (Laxmi Publication)
Construction Engineering and Management – S. Seetharaman (UmeshPublication)
Building Materials – Gurucharan Singh (Standard Publishers, Delhi)

National Institute of Technology Raipur (CG)
Civil Engineering Department
Third Semester

Engineering Geology Code: CE- 315

Total Theory Periods per Week: 3 Total Tutorial Periods per Weeks: 1 Total Marks: 120

Teacher's Assessment: 20 First Examination: 15 Second Examination: 15 End Semester Examination: 70

UNIT 1

Minerals

Minerals, their physical properties, optical properties and chemical properties.

The detailed study of certain rock forming minerals with respect to the physical properties.

Unit 2

Rocks and Rock deformation

Their origin, structure, texture, classification of rocks in brief and their suitability as Engineering materials, dip and strike of bed, Folds, Faults, joints, unconformity and their classification, causes and relation to engineering bahaviour of rock masses.

Unit 3

Earthquake

Earthquake, its causes, classification, seismic zones of India and Geological consideration for construction of building, reservoir related, earthquake problem and its preventive measures, distribution of seismic zones in India.

Unit 4

Landslides and Land subsidence

Landslides, its causes, classification and preventive measures, land subsidence, its causes and preventive measures.

Unit 5

Engineering Geological Sites Selection

Engineering Geological considerations for site selection of Dams and Reservoirs, Tunnels, Bridges and Highways, Geological Maps, concept of geological maps, important terminology used for map and making a section from the map.

Name of Text Books:

A Textbook of Geology – Mukherjee P.K. (World Press Publishers)

Engineering Geology – D.S. Arora (Mohindra Capital Publisher, Chandigarh)

Name of Reference Books:

Geology and Engineering – Leggot, R.F. (Mc-Graw Hill, New York)

A Geology for Engineers – Blyth, F.G.M. (Arnold, London)

Civil Engineering Geology – Cyril Sankey Fox (C. Lockwood and son, U.K.)

Engineering and General Geology – Prabin Singh (Katson Publication House)

National Institute of Technology Raipur (CG)
Civil Engineering Department
Third Semester

Mechanics of Solids Code: CE- 316

Total Theory Periods per Week: 4 Total Tutorial Periods per Weeks: 1 Total Marks: 120

Teacher's Assessment: 20 First Examination: 15 Second Examination: 15 End Semester Examination: 70

Unit 1 Stress Strain Relations : Types of stresses and strains, Mechanicals properties and testing of steel, Hooke's law, Uniaxial tensile test, stress – strain curve, hardness, impact, Poisson's ratio, Modulus of rigidity, Bulk modulus, Relation between the elastic constants, Thermal effects, Elongation of bars of constant and varying sections. Statically indeterminate problems in tension and compression. Thin cylindrical and spherical vessels.

Unit 2 Analysis of Stresses and Strains : Body forces, Surface forces, Internal Force, Stress at a point. Components of stress in rectangular coordinates, Principal stresses, Transformation equations, Stress invariants. Plane stresses. Mohr's circle for plane stress, Differential equations of equilibrium. Deformable bodies, Concepts of normal strain and shear strain, Strain components at a point. Transformation equations. Principal strains. Mohr's circle for strains. Compatibility conditions. Displacement equation of equilibrium, Plane strain.

Unit 3 Bending of Beams : Theory of simple bending - limitations - bending stresses in beams of different cross sections, beams of uniform strength, beams of two materials, shear stresses in symmetrical elastic beams transmitting both shear and bending moment. Shear force and bending moment diagrams for simply supported overhanging and cantilever beams and statically determinate plane frames

Unit 4 Columns and Combined stresses : Stable and unstable equilibrium, Short columns, Euler's formula for long columns, Rankin's formula. Beams subjected to bending and shear, Eccentrically loaded short column, Kern of rectangular sections, Middle third rule, stability of gravity dams & retaining walls.

Unit 5 Unsymmetrical Bending and Torsion : Unsymmetrical bending – Location of neutral axis, Shear flow - shear centre - determination of shear centre for simple sections. Torsion of circular solid and hollow circular shafts - power transmission. Closed coiled and open coiled helical springs.

Name of Text Books:

Strength of Materials – R.K. Rajput (S. Chand & Co.)
Mechanics of Materials – B.C. Punmia (Laxmi Publication)

Name of Reference Books:

Mechanics of Structures (Vol. – I) – Junarkar (Charotar Publications)
Strength of Materials – Timoshenko, S. & Gere (CBS Publishers)
Introductions to Solid Mechanics –Shames & Pitarresi (Prentice Hall of India)
Engineering Mechanics of Solid – Popov (Pearson Publication)
Strength of Materials – S. Ramamurtham (Dhanpat Rai Publications)
Strength of Materials (Part-I) – Timoshenko (CBS Pubishers)

National Institute of Technology Raipur (CG)
Civil Engineering Department
Third Semester

Fluid Mechanics I Lab — Code: CE- 322

Total Periods per Week: 3 — Total Marks: 50

Teacher's Assessment: 30 — End Semester Examination: 20

Experiments to be performed (minimum 10 experiments)

1. To determine the metacentric height of a ship model.
2. To Plot the flow net for a given model using the concept of electrical analogy.
3. Verification of Bernoulli's equation.
4. Verification of momentum equation.
5. To calibrate a venturimeter and study the variation of the coefficient of discharge with the Reynolds number.
6. To calibrate a orificemeter and study the variation of the coefficient of discharge with the Reynolds number.
7. Experimental determination of critical velocity in pipe.
8. Determination of head loss coefficient due to sudden expansion in pipe.
9. Determination of head loss coefficient due to sudden contraction in pipe.
10. Determination of head loss coefficient in pipe bends.
11. To determine the hydraulic coefficients (C*c*, C*d* and C*v*) of an orifice.
12. To determine the coefficient of discharge of a mouth piece.
13. To calibrate a triangular notch.
14. To calibrate a rectangular notch.
15. To obtain the surface profile and the total distribution of a forced vortex.

List of Equipments / Machine Required:

Ship Model
Electrical Analogy Apparatus
Bernoulli's Apparatus
Apparatus for momentum theorem
Venturimeter
Orificemeter
Pipe Flow Apparatus
Orifice Apparatus
Mouth Piece Apparatus
Notch Apparatus
Vortex Flow Apparatus

Recommended Books:

Hydraulics Laboratory Manual – S.K. Likhi (New Age International Ltd.)
Fluid Mechanics – Jagdish Lal (Metropolitan Educational, New Delh-2)

National Institute of Technology Raipur (CG)
Civil Engineering Department
Third Semester

Surveying I Lab — Code: CE- 323

Total Periods per Week: 3 — Total Marks: 50

Teacher's Assessment: 30 — End Semester Examination: 20

Experiments to be performed (minimum 10 experiments)

1. Determination of location of a point with the help of Two point problem.
2. Determination of location of a point with the help of Three point problem.
3. Setting out of curve by ordinates or offsets from long chord.
4. Setting out of curve by successive bisection of arcs.
5. Setting out of curve by offsets from chords produced (Or by deflection distances).
6. Setting out of curve by two theodolite method.
7. To find out the position of points by the Intersection method.
8. To determine the height of object when base is accessible.
9. To determine the height of tower when base is inaccessible and instrument stations are in same vertical plane.
10. To determine height of tower when base is inaccessible and instrument stations are in different plane.
11. To determine sensitivity of bubble tube.
12. Measurement of horizontal angle by repetition method.
13. Measurement of horizontal angle by reiteration method.
14. Contouring and its plotting.
15. To determine the elevation of a point with respect to reference elevation by Fly Leveling.
16. Study of miner instruments.

List of Equipments / Machine Required:

Metric Chain (30 m), Tape (15m, 30 m), Ranging Rod (2 m, 3m), Plumb bob, Arrows
Dumpy Level
Theodolite
Leveling Staff (Folding and Non-folding)
Wooden Pegs
Plain Table Accessories (Drawing Board – 70 x 60 x 1.5 cm, Spirit Level, Trough Compass, Tripod Stand, Alidade, Plumb bob for centering)
Offset Rod
Optical Square
Cross Staff

Recommended Books:

Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
Surveying (Vol. I & II) – Kanetkar T.P. (Pune Vidyarthi Griha Prakashan, Pune)

National Institute of Technology Raipur (CG)
Civil Engineering Department
Third Semester

Material Testing Lab — Code: CE- 326

Total Periods per Week: 3 — Total Marks: 50

Teacher's Assessment: 30 — End Semester Examination: 20

Experiments to be performed(minimum 10 experiments)

1. Determination of Compressive strength of cement.
2. Determination of Fineness of cement by sieving method.
3. Determination of Fineness of cement by Blain Apparatus.
4. Determination of Soundness of cement.
5. Determination of Specific gravity of cement.
6. To determine Uniaxial Tensile Test of mild steel.
7. To determine Compressive Strength of Wood: (a) Along the fibre and (b) Across the fibre.
8. Determination of Specific gravity and water absorption of aggregate.
9. Abrasion Test on tiles.
10. Impact test on tiles.
11. Flexural Strength of Tiles.

List of Equipments / Machine Required:

1. Cube mould 7.06 cm size
2. IS Sieve 80, 40, 20, 10, 4.75, 2.36, 1.18 mm and 600, 300, 150, 90 Micron
3. Sieve Shakers
4. Tensile Strength Testing Machine
5. Oven Wire Basket
6. Spring Balance and Weighing Balance
7. Air permeability blain apparatus
8. Abrasion Testing Machine
9. Flexural Strength Testing Machine for tiles
10. Universal Testing Machine
11. Hardness Testing Machine
12. Impact Testing Machine

Recommended Books:

Lab Manual Concrete Lab – M.L. Gambhir (Tata McGraw Hill)
Concrete Technology – M.S. Shetty (S. Chand & Co.)