Faculty of Engineering & Technology

Study and Evaluation Scheme

Of

Bachelor of Technology

B.Tech. – Civil Engineering

II, III & IV YEAR

(Applicable w.e.f Academic Session 2013-16 till revised)

AKS UNIVERSITY, SATNA

Study and Evaluation Scheme

AKS University, Satna

Sherganj, Panna Road, Satna (MP) 485001

Study & Evaluation Scheme
of
Bachelor of Technology (Civil Engineering)
SUMMARY

Programme :   **B.Tech (CE)**

Duration :   Four year full time (Eight Semesters)

Medium :   English

Minimum Required Attendance : 75 %

Maximum Credits: 163+54 (First Year)= **217**

Evaluation Assessment :	**Internal**	**External**	**Total**
	50	100	150

Internal Evaluation (Theory/ Practical Papers)

	Sessional-I	Sessional-II	Continuous Assessment & attendance
	10	10	10+20= 30

Duration of Examination :	**External**	**Internal**
	3 hrs.	2 hrs

To qualify the course a student is required to secure a minimum of 36% marks in aggregate including the semester end examination, internal assessment evaluation (Both theory & Practical Papers)

A candidate who secures less than 36% or Grade **'D'** of marks in a Subject/Paper(s) shall be deemed to have failed in that Subject/Paper(s). In case a student has secured less than 36% or Grade **'R'** in Subject/Paper(s), he/she shall be deemed to re-appear (ATKT Examination) in Subject/Paper(s) to achieve the required percentage (Min. 36%) or grade (Min. D) in the Subject/Paper(s).

Question Paper Structure

1. *The question paper shall consist of 26 questions in three Sections. Out of which Section-A shall be of Objective type 10 questions and will be compulsory. (weightage 2 marks each).*
2. *Section-B shall contain 10 Short answer type questions and students shall have to answer any eight (weightage 5marks each).*
3. *Out of the remaining six question s are long answer type questions, student shall be required to attempt any four questions. The weightage of Questions shall be 10 marks each.*

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B.Tech. & B.Tech+M.Tech (Integrated)

(Civil Engg.)

III Semester

TEACHING & EXAMINATION SCHEME

S. No	Paper Code	Subjects	Credit Scheme			Total Credit
			L	T	P	
1	02MS301	Engineering Mathematics-III	4			4
2	02GE302	Engineering Geology	4			4
3	02CE303	Surveying-I	4			4
4	02ME304	Strength of Materials	4			4
5	02CE305	Building Materials & Construction	4			4
6	02SD306	SSD-			2	1
1	02CE351	Surveying-I Lab			2	1
2	02CE352	Building materials & Construction Lab			2	1
3	02CE353	Building Planning And Drawing Lab			4	2
4	02GE354	Engineering Geology Lab			2	1
5	02ME355	Strength of Materials Lab			2	1
		Total Credit				**27**

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IV Semester

TEACHING & EXAMINATION SCHEME

Sr.No	Subject Code	Subject	L	T	P	Total Credit
1	02CE401	Environmental Engineering-I	3	1		4
2	02ME402	Fluid Mechanics-I	3	1		4
3	02CE403	Geotechnical Engineering-I	3	1		4
4	02ME404	Theory of Structures-I	3	1		4
5	02CE405	Transportation Engineering-I	3	1		4
6	02SD406	SSD			2	1
1	02CE451	Environmental Engineering-I Lab			2	1
2	02ME452	Fluid Mechanics-I Lab			2	1
3	02CE453	Geotechnical Engineering-I Lab			2	1
4	02CE455	Transportation Engineering-I Lab			2	1
Total Credit						25

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V Semester

TEACHING & EXAMINATION SCHEME

Sr.No	Subject Code	Subject	Credit (L-T-P)			Total Credit
			L	T	P	
1	02ME501	Fluid Mechanics-II	4			4
2	02ME502	Theory of Structures-II	4			4
3	02CE802	Construction Economics and Management	4			4
4	02CE504	Environmental Engineering-II	4			4
5	02CE505	Structural Design & Drawing-(RCC)	4			4
6	02SD506	SSD			2	1
1	02ME551	Fluid Mechanics-II Lab			2	1
2	02ME552	Theory of Structures-II Lab			2	1
3	02CE553	Environmental Engineering-II Lab			2	1
4	02CE554	Structural Design & Drawing-(RCC) Lab			2	1
5	02ME555	Strength of Materials Lab(only for 2012 Batch)			2	1
6	02CE556	Industrial Training-I				5
		Total Credit				**31**

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VI Semester

TEACHING & EXAMINATION SCHEME

Sr.No	Subject Code	Subject	Credit (L-T-P)			Total Credit
			L	T	P	
1	02CE601	Structural Design & Drawing-(Steel)	3	1		4
2	02CE602	Water Resources Engineering-I	4			4
3	02CE603	Quantity Surveying & Costing	4			4
4	02CE604	Concrete Technology	4			4
5	02CE605	Geotechnical Engineering-II	4			4
1	02CE651	Structural Design & Drawing-(Steel) Lab			2	1
2	02CE652	Water Resources Engineering-I Lab			2	1
3	02CE653	Quantity Surveying & Costing Lab			2	1
4	02CE654	Concrete Technology Lab			2	1
5	02CE655	Geotechnical Engineering-II Lab			2	1
Total Credit						25

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VII Semester

TEACHING & EXAMINATION SCHEME

Sr.No	Subject Code	Subject	Credit (L-T-P)			Total Credit
			L	T	P	
1	02CE701	Advanced Structural Design-(RCC)	3	2		4
2	02CE702	Water Resources Engineering-II	4			4
3	02CE703	Elective-I	3	1		4
Practicals						
1	02CE751	Advance Structural Design-(RCC) Lab			2	1
2	02CE752	Water Resources Engineering-II Lab			2	1
3	02CE753	Minor Project				8
4	02CE754	Seminar				5
5	02CE755	Industrial Training-II				5
Total Credit						**32**

List of Elective-I Subjects :

1-Rock Mechanics
2-Water Power Engineering
3-Analysis and Design of Pavements
4-Environmental Pollution and Control

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VIII Semester

TEACHING & EXAMINATION SCHEME

Sr.No	Subject Code	Subject				Total Credit
			L	T	P	
1	02CE801	Advanced Structural Design- (Steel)				4
2	02CE803	Elective-II				4
Project/Seminar						
1	02CE851	Major Project/Seminar				10
2	02CE852	Comprehensive Viva Voce				5
Total Credit						23

List of Elective-II Subjects :

1-Elasticity and Experimental Stress Analysis
2-Structural Dynamics
3-Advance Concrete Technology
4-Advance Numerical Methods
5-Earthquake Resistant Design of Structures

Unit – I: Function of Complex variable
- Definition, derivatives of complex function, Analytic function.
- Cauchy-Riemann equations, in Cartesian form and polar form.
- Conjugate function, Harmonic function, Methods for finding the analytic function.
- Cauchy's integral theorem, Cauchy's integral formula for analytic function.
- Poles and singularities of analytic function, Residue theorem (without proof) and its application.

Unit – II: Numerical Techniques – I
- Finite differences: Difference table [Forwarded Difference operator, Backward Difference operators and central Difference operator]
- Interpolation**:** Newton-Gregory forward and backward interpolation formula for equal intervals, Gauss's forward and backward interpolation formula for equal intervals, Gauss's central difference formula for equal intervals.
- Stirling's formula, Bessel's formula, Everett's formula for equal intervals.

Unit – III: Numerical Techniques – II
- Numerical Differentiation : Newton's forward difference formula and Newton's backward difference formula for derivative, Gauss's forward difference formula for derivative, Newton's divide difference formula for derivative.
- Lagrange's interpolation formula for unequal intervals and Newton's divided difference interpolation for unequal intervals.
- Numerical integration: Trapezoidal rule, Simpson's one third rule, Simpson's three-eight rules, and Weddle's rule.

.**Unit – IV Numerical Techniques –III**
> Numerical solution of algebraic and Transdantal equations: Bisection method, Secant method, Regular-falsi method, Newton-Raphson method and Graeffe's root squaring method.
- Numerical solution of ordinary differential equations: Taylor's series method, Euler's method, Euler's modified method, Picard's method, Runge- Kutta method.
- Solution of simultaneous algebraic equation: Gauss- Seidal method, Gauss elimination method, Guass-jordan method.

Unit – V Probability Distribution
- Binomial Distribution: Hypothesis, characteristics, mean, variance and standard deviation and moments.
- Poisson distribution: Hypothesis, characteristics, condition for Poisson distribution, mean, variance and standard deviation.
- Normal Distribution: Standard normal distribution, properties of normal curve.
- Curve fitting: Method of least squares, Fitting of straight lines, and parabola of second degree.

Text Books:
1. D.C. Agrawal, Engineering Mathematics-III, Sai prakasan
2. H.K.Das, Basic Engineering Mathematics-III, S.Chand & company Ltd.

3. D. K. Jain., Engineering Mathematics-III

4. Sonendra Gupta, Engineering Mathematics-III, Dhanpat Rai Publishing   Company(P) Ltd.

Reference Books:-
1. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 2004.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
3. Chandrika Prasad, Advanced Mathematic for Engineers, Prasad Mudranalaya,1996.
4. B.V.Ramana,Higher Engineering mathematics,Tata Mcgraw-Hills Publishing Company Limited.

B.TECH. (Civil Engineering)
III SEMESTER
GEOLOGY -1

UNIT-1 **Introduction to Geology**
Mineralogy Minerals – definition, formation and occurrences. Identification – physical, chemical and optical. Classification of minerals.
Crystallography Scope, crystal systems. Polymorphism and isomorphism.

UNIT-2 **Economic Geology Ores and gangue**
genesis, classification, distribution in India and geological occurrences. Uses of important metallic and non-metallic minerals.
Atomic mineral resources of India – genesis and occurrence.

UNIT-3 **Structural Geology**
Concept of Deformation; Primary and Secondary Planer & Linear Structure of Rocks; Topography and its Representation. Altitude of strata- Dip and strike; Outcrop patterns; Width of Outcrop and Thickness of beds; Structural Contours; Geological Maps; Study of Unconformity; Folds, Joints, Faults and their influence in Mining Operations.
Stratified rocks and their structures. Attitude of strata. Outcrop and in crop

UNIT-4 **Folds**
Genesis, classification, identification in field, impact on landscape, mineral deposits, mining and tunneling. Faults mechanism of faulting, classification, impact of faulting on topography, significance of faults in mining engineering and tunneling.
Joints
Definition and characteristics, classification, occurrence of joints in igneous, sedimentary and metamorphic rocks. Engineering considerations and treatments.

UNIT-5 **Prospecting and Exploration**
Geological guides for prospecting of mineral deposits. Introduction to different methods of prospecting for mineral deposits – geological, geophysical, geochemical, geobotanical, aerial photography and remote sensing. Exploratory drilling methods. Trenching and pitting. Sampling grids. Drill hole logging. Deviation of drill holes and drill hole surveying. Directional drilling. Reserve Estimation Selection of methods, merits and demerits, applicability.

Text Books:
1. Engineering And General Geology : Parbin Singh
2. Physical And Engineering Geology : S.K. Garg
3. Rutley's Elements of Mineralogy : H.H. Read
4. Principles Of Petrolog y : G.W. Tyrell

Reference Books:
1. Structural Geology : M.P. Billings
2. Geological Maps : G.W. Chiplonkar
3. A Text Book of Geology : P.K. Mukherjee
4. Applied Geology : S. Banger
5. Applied Geology : D.V. Reddy
6. Engineering Geology : D.V. Reddy
7. Geology of India (Vol I&II) : R. Vaidyanadhan & M. Ramakrishnan

B.TECH. (Civil Engineering)
III SEMESTER
SURVEYING -I

UNIT-1

Surveying – Introduction, classification and basic principles. Linear measurements, Chain surveying – definition, selection of survey station and lines, types of ranging & chaining. Types of chains, recording the measurement, offset measurement, cross staff optical square, prism square, obstacles in chaining and ranging – chain and tape errors & corrections.

UNIT-2

Methods of Traversing, prismatic and surveyors compass angle and bearing, quadrental system, local attraction magnetic declination dip traversing plotting bow ditch rule, transit rule, errors in compass survey, their elimination and correction.

UNIT-3

Plane Table Surveying – Instruments, accessories, methods, principle two points, three points problems, errors in Plane Tabling, minor instruments, Hand level, Abney level, clinometer, sextant, planimeter.

UNIT-4

Levelling and Contouring.

UNIT-5

Advance surveying technology: Thedolite, Temporary and Permanent Adjustment of Theodolite. Introduction to GIS & Remote Sensing.

Practicals:
- ✓ Chain survey of an area and preparation of map.
- ✓ Compass survey of an area and plotting of compass survey.
- ✓ Plane table surveying; Leveling. L-section and Xsections and its plotting.
- ✓ Contour survey of an area and preparation of contour map.
- ✓ Introduction of software in drawing contour.
- ✓ Theodolite surveying; Ranging by theodolite, Height of object by using theodolite.
- ✓ Setting out curves by theodolite.
- ✓ Minor instruments.

Text Book:
1. B.C.Punamia,; Surveying & Levelling Vol.-I;Lakshmi Publication, New Delhi.
2. Kanetkar, T.P. and Kulkarni, S.P. 1965. Surveying and Levelling. A.V. Griha Prakashan, Pune-4.

Reference:
1. Agor, R. 1998. Surveying and Levelling, Khanna Publishers, New Delhi.
2. Kochher, C.L. 1986. A Text book of Surveying. Vol. I and Vol. II. Katson Publishing House, Ludhiana.

B.TECH. (Civil Engineering)

III SEMESTER
STRENGTH OF MATERIALS

UNIT - 1 **Introduction**
Basic of stress & strain, Elastic constant, Stress-strain diagram, Hooke's law, Stresses in the components subjected to multi-axial forces, Temperature stresses, Statically indeterminate system.

UNIT - 2 **Bending of Beams**
Bending of beams with symmetric section, boundary condition, Pure bending, Bending equation, traverse shear stress distribution in circular, hollow circular, I & T section.

UNIT – 3 **Deflection of Beam**
Relation between slope deflection and radius of curvature, solution of beam deflection, problem by Macaulay's method, Direct integration method, Method of super position, Moment Area Method.

UNIT -4 **Torsion**
Deformation in circular shaft due to torsion, Basic assumption, Torsion equation, Stresses in elastic range, Angular deflection, hollow and stepped circular shaft. Spring: Closed and open coil helical spring subjected to axial load, spring in parallel & series.

UNIT - 5 **Principle Stresses and Strain**
Transformation of plane stresses, Principle stresses, Maximum shear stresses, Mohr's circle for plane stresses, Plain strain and its Mohr's circle representation, Principle strains, Maximum shear strain. Combined Loading: Components subjected to bending, torsion & axial loads.

Text Books:
1. Elements of strength of material – Timoshenko & young- EWP press
2. Mechanics of Solids – Beer & Johnson, Tata McGraw Hill Publications.
3-Strength of Material-RS Khurmi,Chand (S) & Company India Limited

Refrence Books:
1. Strength of material – Rider–ELBS
2. Introduction to Solid Mechanics – I.H.Shames–PHI
3. Strength of Materials – R.K. Rajput – Dhanpat Rai & Sons
4. Strength of Materials – Dr. Sadhu Singh – Khanna publication.

Practicals:
- ✓ To study the Universal Testing Machine.
- ✓ To Perform the tensile test of Mild steel on UTM and to draw Stress-Strain Curve.
- ✓ To Determine the strength of Wood on UTM (1) Along the grain (2) Across the grain.
- ✓ To determine Shear Strength of Mild Steel on UTM.
- ✓ To Study the Brinell Hardness Machine and to determine the Brinell Hardness of the given material.
- ✓ To study the impact testing machine and test specimen of Izods and charpy.
- ✓ To study the fatigue testing machine and to discuss the procedure to find out endurance limit of given material.
- ✓ To study the spring testing machine.
- ✓ To study the Rockwell Hardness testing machine.
- ✓ To study the Buckling of Coulmn.

B.TECH. (Civil Engineering)

III SEMESTER
BUILDING MATERIALS & CONSTRUCTION

UNIT 1 :
Classification of Materials, economics of Building Materials. **Building stones** – Characteristics, Testing, Preservation, Common Building stones. **Bricks –** Conventional and Fly ash Bricks, Testing, Efflorescence. **Cement –** Physical properties, composition, manufacture, setting of cement, types of cement, field and laboratory tests, uses. **Mortar –** Bulking of sand, Tests for sand, properties of good mortar, preparation of mortar, uses of mortar. **Gypsum –** Properties, Building Products and their uses. **Pozzolana** – Fly ash and Surkhi (Properties and uses).**Timber –** Classification of timber, Engineering properties of timber, Defects in timber, Factors affecting strength of timber, seasoning and preservation of timber. Wood based eco-friendly timber products. **Asphalt, Bitumen and Tar** – Terminology, specifications and uses. **Refractories** – Introduction & Classification.

UNIT 2 :
Chemistry of Plastics - manufacturing process, classification, advantages of plastics, Mechanical properties and their uses.
Paints, varnishes and distempers - Common constituents, types and desirable properties, Cement paints. Ferrous metals. Characteristics of reinforcing steel. Principles of cold working. Reinforcing steel – physical and magnetic properties, chemical composition, uses. Brief discussion on properties and uses of Aluminum and lead.
Glass – Ingredients, properties, types and uses in construction.
Insulating Materials - Thermal and sound insulating materials, desirable properties and types.

UNIT 3 :
Components of building, area considerations, construction principles & methods for layout. Damp Proofing ant termite treatment. Vertical circulation – staircases, ramp design and construction. Different types of floors and flooring materials (Ground floor & upper floors). Bricks and stone masonry construction. Cavity wall and hollow blocks.

UNIT 4 :
Doors, Windows and Ventilators - Construction details, types, relative advantages & disadvantages. Roofs - types and treatments. Lintels and Chhajja. Plastering and pointing, Water supply and Sanitary fittings (Plumbing), Electricity, Heating, Ventilation & Air conditioning. Mechanical Lifts & Escalators, Fire fighting, Acoustics. Principles & Methods of building maintenance.

UNIT 5 :
Energy efficient buildings, Energy Conservation Building Code (ECBC), Bureau of Energy efficiency (BEE) and its role in Civil Engineering.

Reference Books :
1. S.K. Duggal : Building Materials, New Age International.
2. P.C. Varghese : Building Materials PHI.
3. Rangwala : Engineering Materials (Material Science).
4. Birdie and Ahuja

Practicals:

1. **Cement**
   (i) Normal Consistency of cement.
   (ii) Initial & final setting time of cement.
   (iii) Compressive strength of cement.
   (iv) Fineness of cement by Le-chatalier's apparatus.
   (v) Soundness of cement.
   (vi) Tensile strength of cement.

2. **Coarse Aggregates**
   (i) Crushing value of aggregates.
   (ii) Impact value of aggregates.
   (iii) Water absorption of aggregates.
   (iv) Sieve analysis of Aggregates.
   (v) Grading of aggregates.

3. **Fine Aggregates**
   (i) Sieve analysis of sand.
   (ii) Bulking of sand.

4. **Bricks**
   (i) Water absorption.
   (ii) Dimensional Tolerance.
   (iii) Compressive strength.
   (iv) Efflorescence.

3rd Semester

B.Tech (Engg.)/B.Tech (Ag.)/B.Tech (BT)/B.Sc.(Hons) Ag./B.Sc (BT)/B.Pharm/BBA/B.Com/B.com(Hons)/BCA(Hons)/B.Sc. (IT)/Diploma (Engg.)

CSEP PROGRAM: This programme is devised to give you all an exposure to the language used in various communication activities. The objective of the programme is to enhance our communication skills. Research says that the more you listen and speak a language the faster you learn. In these sessions, we are going to practice to speak sentences and words used in different situations. Once you have the command on the language, you can use it for any context; be it interviews, presentations, business, technology so on and so forth.

Learning through activities is more effective than learning through lectures and books. We are going to provide you with opportunities to make speeches, presentations, interact with various people etc.

Unit-1

Thematic structure: Money, Cricket, A trip to Gizmo world, Culture and Shopping

Assignment: Progress Test-1

Unit-2

Thematic structure: Festivals, Computers, Auto mania, Environment and studying abroad.

Assignment: Progress Test-2

Unit-3

Thematic structure: Internet, Fashion & Style, Globalization, all about jobs and Trends in Technology.

Assignment: Progress Test-3

Unit-4

Conversation Questions: College, Beauty and Physical attractiveness, Food and eating, Entertainment, Advertising, Films in your own language, Books & reading.

Activities: Reading newspaper and news analysis, Role plays, Extempore, JAM, Story creation, Picture description, Group Discussion and celebrity Interview.

Assignment: Post assessment Test

B.TECH. (Civil Engineering)

III SEMESTER
BUILDING PLANNING AND DRAWING LAB

Drafting of Following Using any CAD Software

1- Symbols used in Civil Engineering

2- Doors, Windows and Staircases.

3- Plumbing & Electrical Fitting Drawing.

4- Comprehensive Drawing of residwntial building (Layout, Plan, Elevation & Sectional elevation, Plumbing & Electrical Fillings in out

5- Preparation of Layout planning of different civil engineering projects.

6- Preparation of Layout plan/Map and building drawing using computer.

IV SEMESTER
ENVIRONMENTAL ENGINEERING - I

Unit – I

Estimation of ground and surface water resources. quality of water from different sources, demand & quantity of water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.

Unit – II

Impurities of water and their significance, water-borne diseases, physical, chemical and bacteriological analysis of water, water standards for different uses. Intake structure, conveyance of water, pipe materials, pumps - operation & pumping stations.

Unit – III

Water Treatment Methods-Theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

Unit – IV

Layout and hydraulics of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection, maintenance of distribution systems, service reservoir capacity and height of reservoir.

Unit – V

Rural water supply schemes, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation, building drainage system of plumbing.

Text Book:

1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi

Reference Books:

1) Water & Waste Water Technology by Mark J.Hammer - Prentice - Hall of India, New Delhi
2) Environmental Engineering - H.S. Peavy & D.R.Rowe - Mc Graw Hill Book Company,
3) Water Supply & Sanitary Engg. by S.K. Husain
4) Water & Waste Water Technology - G.M. Fair & J.C. Geyer
5) Relevant IS Codes

List of Experiments:

1. To study the various standards for water
2. To study of sampling techniques for water
3. Measurement of turbidity
4. To determine the coagulant dose required to treat the given turbid water sample
5. To determine the conc. of chlorides in a given water samples
6. Determination of hardness of the given sample
7. Determination of residual chlorine by "Chloroscope"
8. Determination of Alkalinity in a water samples
9. Determination of Acidity in a water samples
10. Determination of Dissolved Oxygen (DO) in the water sample.

B.TECH. (Civil Engineering)
IV SEMESTER
FLUID MECHANICS-I

Unit-I
Review of Fluid Properties: Engineering units of measurement, mass, density, specific weight, specific volume, specific 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 & nonuniform, one, two and three dimensional flow, path lines, streaklines, 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.
Fluid Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturimeter, 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.
Text Book:
1) Dr. D S Kumar, S. K. Kataria & Sons, New Delhi; Fluid Mechanics & Fluid Power Engg.

References Books:
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) Essential of Engg Hyd. By JNIK DAKE; Afrikan Network & Sc Instt. (ANSTI)
6) A Text Book of fluid Mech. for Engg. Student by Franiss JRD
7) R Mohanty; Fluid Mechanics By; PHI
8) Fluid Mechanics; Gupta Pearson.

List of Experiments:

1. To determine the local point pressure with the help of pitot tube.
2. To find out the terminal velocity of a spherical body in water.
3. Calibration of Venturimeter
4. Determination of Cc, Cv, Cd of Orifices
5. Calibration of Orifice Meter
6. Calibration of Nozzle meter and Mouth Piece
7. Reynolds experiment for demonstration of stream lines & turbulent flow
8. Determination of metacentric height
9. Determination of Friction Factor of a pipe
10. To study the characteristics of a centrifugal pump.

B.TECH. (Civil Engineering)
IV SEMESTER
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 behaviour. 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, Permaeability 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, 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 gaurd'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 cosion-less and cohesive soils. Effect of surcharge, water table and wall friction. Arching in soils. Reinforced earth retaining walls.

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

Text Book:

1. Punamia B.C.;Fundamentals Soil Mechanics;Laxmi Publication,New Delhi.
2. Arora, K.R. 2000. Soil Mechanics and Foundation Engineering. Standard Publishers and Distributors, New Delhi.

Reference Books:
1. Capper, P.L. and Cassie, W.F. 1961.The Mechanics of Engineering soils. Asia Publishing House
2. Verma, B.P. 1996. Problems in Soil Mechanics and Foundation Engineering. Khanna Publishers,

B.TECH. (Civil Engineering)
IV SEMESTER
THEORY OF STRUCTURES-I

Unit-I: 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
Static and Kinematics indeterminancy, Analysis of Fixed andcontinuous 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, focallength, EUDL, Influence Lines for Determinate Structures- Beams, Three Hinged Arches.

Text Book:
1)Theory of Structures B.C.Punmia, Ashok Jain, Arun Jain

Reference Book:
1)Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach,
Chapman and Hall, New York.
2) Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
3) Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
4) Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
5) Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill
International, Tokyo

UNIT-1

Highway Development and Planning: Historical Development, road patterns, master plans, road development plans, PMGSY, engineering surveys, highway projects.
Highway Materials and Testing: Subgrade soil, sub base and base course materials, bituminous materials, testing of soil, stone aggregates and bitumen.

UNIT-2
Highway Geometric Design: Cross section elements, sight distances, horizontal and vertical alignment.

UNIT-3
Traffic Engineering: Traffic characteristics, road user & vehicular characteristics, traffic studies, accident studies, traffic operations, traffic control devices, intelligent transport systems, pollution due to traffic.

UNIT-4
Design of Highway Pavements: Flexible pavements and their design, review of old methods, CBR method, IRC:37-2001, equivalent single wheel load factor, rigid pavements, stress in rigid pavement, IRC design method (IRC:58-2002).

UNIT-5
Highway Construction: Construction of various layers, earthwork, WBM, GSB, WMM, various types of bituminous layers, joints in rigid pavements
Highway Maintenance: Various type of failures, evaluation and remedial measures.

Text Books:
   1) Highway Engineering-Gurucharan Singh

Reference Books:
   1)   Khanna, S.K. and Justo, C.E.G., "Highway Engineering", Nem Chand & Bros.2004
   2)   Khanna, S.K. and Justo, C.E.G., "Highway Material Testing Manual", Nem Chand & Bros
   3)   Kadiyali, L.R., "Traffic Engineering and Transportation Planning", Khanna Publishers.
   4)   Sharma, S.K., "Principles and Design of Highway Engineering", S. Chand & Co.
   5)   Highway Engineering by Gurucharan Singh
   6)   Principles of Pavement Design by E.J. Yoder & M.W. Witzech
   7)   Highway Engineering by O'Fleherty
   8)   Highway Engineering by S.K. Khanna & C.E.G. Justo
   9)   Airport Planning & Design by S.K. Khanna & M. G. arora
   10) Foresch, Charles "Airport Planning"
   11) Horonjeff Robert "The Planning & Design of Airports"

List of Experiments:
1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value

4. Determination of California Bearing Ratio values
5. Determination of penetration value of Bitumen
6. Determination of Viscosity of Bituminous Material
7. Determination of softening point of bituminous material
8. Determination of ductility of the bitumen
9. Determination of flash point and fire point of bituminous material
10. Determination of Bitumen content by centrifuge extractor
11. Determination of stripping value of road aggregate
12. Determination of Marshall stability value for Bituminous mix
13. Determination of shape tests on aggregate

4th Semester

B.Tech (Engg.)/ B.Tech (Ag.)/ B.Tech (BT)/ B.Sc.-Ag(Hons)/ B.Sc (BT)/ B.Pharm/ BBA (Hons) / B.Com/B.com(Hons)/ BCA(Hons)/ B.Sc.(IT) Hons./ Diploma (Engg.)

What is soft Skills?
The bundle of Skills which helps a person to perform a task better in a more satisfying way for both the performer and spectator (In personal, Professional and social life).

Why it is required?
To make a person to perform a task with better understanding of who, where, when, what, how and with whom a job can be executed to deliver the best expected result in perfect timing.

Learning Outcome: On completion of the course (SSD), the student should be able:

> ➢ Understand the Importance of various skills involved in developing enriching Interpersonal relationship.
> ➢ Be more aware of his/her own self- Confidence and values.
> ➢ Learn how to go about being a good team player and form an effective team.
> ➢ Understand the skills tested and participate effectively in Group discussion.
> ➢ Learn the basics of how to make an effective Presentation and have numerous practice Presentation in small groups and larger audiences.

Unit-1

Conceptual Sessions: Soft skills – a general overview, Industry Expectations, SWOT & STAR, Self Discovery, Leap to success- 7 Orientations,

Activity: Castle Plan.
Assignment : Sentence fluency assignment

Unit-2

Conceptual Sessions: Attitude, Time Management, Goal setting, Team building and leadership,

Activity: Early Bird and second mouse and Lost at Sea.

Assignment : Goal setting Assignment (Pre and Post)

Unit-3

Conceptual Sessions: Telephone etiquettes- Preparing for business calls/Making business calls/Telephonic phrases, Dining etiquettes, Email etiquettes, Corporate grooming and dressing

Activity: Role play in different scenarios/ Socialization and networking.

Assignment : Progress test on general etiquettes.

Unit-4

Conceptual Sessions: Group discussion: Introduction and definition of a GD, Purpose of a GD, Types and strategies in a GD, Do's and Don'ts in GD, Speak to Impress (Presentation skill), Anchoring in formal setting, Reading Comprehension

Activity: GD Practise and Presentation on Company profile.

Assignment : Reading Comprehension assignment.

B.Tech (Civil Engg.)

V Semester
Fluid Mechanics-II

Unit-I

Turbulent flow : Laminar and turbulent boundary layers and laminar sublayer, hydrodynamically 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, Saint Vegnet equation.

Unit-III

Non-uniform flow in open channels : Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow, hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume.

Unit-IV

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

Unit-V 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.

Pumps:

Centrifugal pumps : Various types and their important components, manometric head, total head, net positive suction head, specific speed, shut off 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.

List of Experiments

1. Study the performance characteristics of Pelton Wheel
2. Study the performance characteristics of Francis Turbine
3. Study the performance charactristics of Kaplan Turbine
4. Calibration of multistage (Two) Pump & Study of characteristic of variable speed pump
5. To study the performance & details of operation of Hydraulic Ram
6. Determination of coefficient of discharge for a broad crested weir & to plot water surface Profile over weir
7. Study of the characteristic of the Reciprocating pump

Suggested Books & Study Material:

1. Fluid Mechanics - Modi & Seth - Standard Book house, Delhi
2. Open Channel Flow by Rangaraju - Tata Mc Graw - Hill Publishing Comp. Ltd., New Delhi
3. Fluid Mechanics - A.K. Jain - Khanna Publishers, Delhi
4. Fluid Mechanics, Hydraulics & Hydraulic Machanics - K.R. Arora - Standard Publishers Distributors 1705-B, Nai Sarak, Delhi-6
5. Relevant IS codes.

B.Tech (Civil Engg.)

V Semester
Theory of Structures-II

Unit. I

Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

Unit. II

Plastic analysis of beams and frames.

Unit. III

Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

Unit. IV

Matrix method of structural analysis: force method and displacement method.

Unit. V

Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns.

List of Practicals
1. To study columns with different end conditions
2. To determine determinacy of a structure
3. To study 3-hinged arch
4. To study 2-hinged arch.

Reference Books :-
1. Theory of structures, BC Punmia
2. Structural analysis, Bhavikatti
3. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
4. Structural analysis, Ramamrutham
5. Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Publishers & Distributors,
Delhi.

B Tech (Civil Engg)
V Semester

Construction Economics and Management

UNIT-I

Introduction to Engineering Economics & Management, importance of Construction Economics & Management, Cash flow diagram, Tune value of money, Inflation, Interest and Depreciation.

UNIT-II

Present worth and capitalized cost, Equivalent uniform annual cost and rate of return evaluations, Benefit cost analysis, Analysis of variable costs, Types of capital financing, Valuation.

UNIT-III

Tendering and Contract : Organisational structure, Methods of tendering, Specifications, Conditions of contract, Contract law,Disputes and Arbitrations.

UNIT-IV

Construction Planning and Management : Time, Cost and research management of projects for planning, Scheduling, Control and forecasting using networks with CPM/PERT. Personnel, Material and Finance Management, Safety Engineering.

UNIT-V

Construction Equipments :Selection, Planning and Cost Equipments, Earthmoving, Excavating, Hauling, Compacting, Drilling and Blasting,Grouting, Conveying and Dewatering Equipments. Aggregate Cement Concrete and Asphatt Concrete Plants.

Text Book:

1-Sengupta, B. and Guha, H., 'Construction Management and Planning', Tata McGraw Hill, New Delhi.

Reference Books:

1. Moder, J.J. & Phillips, C.R., 'Project Management with CPM and PERT'.
2. Srinath, L.S. PERT and CPM, 'Principles and Applications', East West Press, New Delhi.
3. Pilcher, R., 'Appraisal and Control of Project Cost'.

B.Tech (Civil Engg.)
V Semester
Environmental Engineering-II

Unit - I
Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.

Unit -II
Characteristics and analysis of waste water, cycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, ThOD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self purification capacity of stream.

Unit -III
Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.

Unit - IV
Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

Unit - V
Advanced Waste Water treatment - Diatomaceorus earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physical and chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods.
Rural sanitation - collection & disposal of refuse, sullage & night soil

List of Experiments
1. To study the various standards for waste water
2. To determine the alkalinity in water sample
3. To determine the acidity in water sample
4. Determination of Dissolved Oxygen in the waste water sample
5. Determination of Biological Oxygen demand of a waste water sample
6. Determination of Chemical Oxygen demand of a waste water sample
7. Determination of various types of solids in the waste water sample

Reference Books
1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company,
2. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
3. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
4. Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company New Delhi
5. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
6. Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi

B.Tech (Civil Engg.)
V Semester
Structural Design & Drawing-(RCC)

Unit – I
Basic Principles of Structural Design : Assumptions, Various properties of concrete and reinforcing steel, characteristic strength, partial safety factors; Balanced, under-reinforced and over-reinforced sections, Depth of neutral axis, Deflection limits.

Unit - II.
Design of Beams: Design of singly reinforced rectangular Beam, Doubly reinforced rectangular Beam, Cantilever Beam, Continuous Beam.

Unit-III.
Design of Slabs: Design of one way Slab, Continuous Slab, Cantilever Slab, Two way slab.

Unit -IV.
Columns & Footings: Effective length of columns, Design of axially loaded Short column (Rectangular and circular), Design of Isolated column footing subjected to axial loads.

Unit -V.
Staircases: Design of stairs, Design of tread-riser type staircase.

NOTE :- All the designs for strength and serviceability should strictly be as per IS:456-2000. Use of SP-16 (Design aids)

TextBook:-
Design of RCC Structural Elements – SS Bhavikatti, New Age International Publishers.

Suggested Books: -
1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Limit State Design by P.C.Varghese, Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
4. Plain & reinforced concrete - Ramamrutham
5. Plain & reinforced concrete – B.C. Punmia

LIST OF PRACTICALS / TUTORIALS:
1. Preparation of structural plan for framing of a building showing position of columns and beams.
2. Longitudinal section, cross section of singly reinforced beam with bar bending schedule.
3. Longitudinal section, cross section of doubly reinforced beam.
4. Longitudinal section and sectional plan of one way R.C.C slab with schedule of reinforcement.
5. Longitudinal section and sectional plan of two way R.C.C slab with schedule of reinforcement
6. Longitudinal section, cross section of T-beam and L-beam
7. Preparation of sectional elevation and plan of column and column's footing.
8. Preparation of sectional elevation and plan of Dog-legged and open-well staircase.

5th Semester

B.Tech (Engg.)/B.Tech (Ag.)/B.Tech (BT)/B.Sc.(Hons) Ag./B.Sc (BT)/B.Pharm/BBA/B.Com/B.com(Hons)/BCA(Hons)/Diploma (Engg.)

Introduction to CPP Program: 'Soft skills' are a framework of desirable qualities which gives a candidate an edge over his peers during the selection process of a company. We, at AKS University, have designed the Campus Placement Program (CPP) to help out our students who are sitting for their placement process in various Companies.

Objective of The Program:

- ❖ Develop effective communication and Presentation skills.
- ❖ Develop all-round personality with a mature outlook to function effectively in different circumstances.
- ❖ Take part effectively in various selection procedures adopted by the recruiters.
- ❖ Develop broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets.

UNIT-1

Talking about Present, Past and Future, Describing Processes and operations, Expressing Opinion: Agreement & Disagreement, Pronunciation and neutral accent, Group Discussion: Concept and Practice, Resume Writing.

UNIT-2

Public Speaking: A presentation about the company will be made by the students throughout the Unit. Each and every student is required to go through at least 10 Companies Profile related to their domain expertise. Basically the presentation includes the information like selection procedure, company's milestones, organizational achievements, candidate scope of improvement within the organization if selected, salary, employment benefits. Usually this presentation will end up with question and answer session, students given chance to ask questions about company.

UNIT-3

Mastering Personal Interviews: Paper Interview, Personal Interview, FAQs, Interview Practice, Domain Specific Interview Preparation, Peer review- Pair interview, Interview model (Vocabulary for an effective Interview).

UNIT-4

Communication Skills and Reading Comprehension Test Preparation: Interpersonal Communication Assignment, Sentence Fluency Assignment, A way with words Assignment, Vocabulary Assignment, Communication skills placement paper Test, Reading Comprehension Assignment, Communication Assignment: Presentation Skills and Group discussion.

B.Tech (Civil Engg.)
V Semester
<u>STRENGTH OF MATERIALS – LAB</u>

LIST OF PRACTICALS / TUTORIALS:
1. Tension test
2. Bending tests on simply supported beam and Cantilever beam.
3. Torsion test
4. Hardness test
5. Impact test
6. Shear test

B.Tech (Civil Engg.)
VI Semester
Structural Design & Drawing-(Steel)

Unit-I
Structural & Mechanical properties of steel, various Indian Standard Sections, various loads and mechanism of load transfer, Design of bolted, welded and riveted connection, eccentric connection, HSFG bolt.

Unit –II
Design of Tension members, design of compression member, design of roof truss (angular and tubler), design of purling.

Unit-III
Load carrying capacity of column, design of simple & built-up column, design of column bases, design of lacing & battons, grillage foundation.

Unit IV
Laterally supported & unsupported beam, web crippling, web buckling, design of simple & built-up beams, plate girder, design of gantry girder, design of beam-column connection.

Unit V
Design of Industrial building, frames, loading of multi-story frame, bracing for high rise building, types of steel tower, design of transmission tower, Provision for earthquake resistance design.
Note: All the designs should strictly as per latest version of IS:800

References
Design of steel structure by limit state method by Subramanian
Design of Steel structure (limit state approach) by S K Duggal
Design of steel structure, by limit state method by S S Bhavikatti

List of Experiments:
1. Design of simple bracket connection
2. Design of concentric connection
3. Design of a truss with purlin
4. Designof a builtup beam
5. Design of a builtup column with lacing and slab base
6. Design of a builtup column with battens and gusset base
7. Design of a welded plate girder
8. Design of a bolted plate girder
9. Design of a gantry girder
10. Design of an industrial building frame
11. Design of a transmission tower

B.Tech (Civil Engg.)
VI Semester
Water Resources Engineering-I

Unit-I

Hydrology : Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, raingauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

Unit-II

Floods and Ground water: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence-causes and effects. reclamation of water logged and salt affected lands.

Unit-III

Water resources planning and management : Planning of water resources projects, data requirements, economic analysis of water resources projects appraisal of multipurpose projects, optimal operation of projectsintrouduction to linear programming and its application to water resources projects. Role of water in the environment, rain water harvesting, impact assessment of water resources development and managerial measures.

Unit – IV

Irrigation water requirement and soil-water-crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development. Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity,optimum water supply, consumptive use and its determination. Irrigation methods surface and subsurface, sprinkler and drip irrigation.Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

Unit – V

Canal irrigation: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, lininings-objectives, materials used, economics.Canal falls & cross drainage works, - description and design, head and cross regulators. escapes and outlets, canal transitions.

Well irrigation: Types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation.

Suggested Books :-
1. Engg. Hydrology - J.NEMEC - Prentice Hall
2. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
3. Engg. Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
4. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
5. Engg. Hydrology by H.M. Raghunath

B.Tech (Civil Engg.)
VI Semester
Quantity Surveying and Costing

Unit I
Introduction: Purpose and importance of estimator, Principal of estimate, Types of estimator, Methods of taking out quantity of items of work, unit of measurement for different item, mode of measurement, measurement sheet and abstract sheet, bill of quantity, preliminary estimate, plingth area & cubical content rate, original, revised & supplementary estimate for different projects.

Unit II
Rate analyses; Task for average artisan, various factors involved in the rate of an item, material and labour measurements for various trader, preparation for rate of important items of civil work like excavation, concreting, flooring, masonry, plastering, painting, RCC, etc. current schedule of rates.

Unit III
Detailed Estimate: Preparing detailed estimates of various types of buildings, centre line method & long wall/short wall method, preparing detailed estimate for earth work of road, canals, Estimate of culvert, bridges and water tanks, preparing estimate for services of building such as water supply, sanitary & electrification.

Unit IV
Cost of Work: Factors affecting cost of project, overhead charges, contingencies, and work charge establishment, charges for different services in building & indirect cost, cost analyses of projects, preparation of detailed project report (DPR). Detailed specification for item of civil work.

Unit V
Valuation: Purpose of valuation, Depreciation, Sinking fund, Scrap value, Yearly purchase, Type of values, gross and net income, Fixation of value to a building dual rate interest, method of valuation, Rent fixation of building.

References
Quantity Surveying & Costing by B N Dutta
Estimating & Costing by Rangawala
Estimating & Costing for civil work by G S Birdi
Quantity Surveying & Costing by Chakraborty
List of Exercises
1. Prepare preliminary estimate for a project of college
2. Prepare detailed estimate of three room single story building
3. Prepare detailed estimate of two rooms double story building
4. Prepare estimate for a road of 1 Km length
5. Prepare estimate of a culvert
6. Prepare valuation report of an existing building
7. Prepare rate analyses for five item of building construction
8. Prepare detailed specification for five item of building construction
9. Carryout cost-benefit analyses for a small project
10. Prepare DPR for a new project proposed in surrounding.

B.Tech (Civil Engg.)
VI Semester
Concrete Technology

Unit I

Advantages and disadvantages of concrete, classification, properties and grades of concrete, In-gradients of concrete, Quality requirements of ingradients, Types of cement, Aggregates, water & Admixtures, Chemical & mineral admixtures, Fly Ash, Blast furnace slag & silica fume etc.

Unit II

Properties of concrete in fresh state, hardening process of concrete, workability, Tests of workability, Air entrainment, factors affecting rheology of concrete, Compressive strength, Split tensile strength, Flexural strength, stress-strain curve, shrinkage, creep, thermal property, permeability of concrete, factors affecting strength of concrete, durability of concrete, chloride resistance, sulphate resistance, carbonation, Alkali-Aggregate reaction, factors affecting durability of concrete.

Unit III

Normal & Design mix rates, various methods of concrete mix design, IS code method, ACI method, factors influencing choice of mix design, Acceptance criteria for concrete, Design of concrete mix with mineral admixtures, plastic concrete mix, Design of concrete mix by computer aided method, Measurement of concrete mix for durability.

Unit IV

Production of crushed stone aggregate, Batching equipments for production of concrete, Batching, Mixing, compaction, moulding & curing of concrete, Hand mixing and machine mixing, Hand compaction & vibration, vibrators & mixers. Concreting under water, hot and cold weather condition. Non-destructive testing, Field control, repair technology, Inspection & testing of concrete.

Unit V

Light weight concrete, heavy weight concrete, Ready mixed concrete, mineral base concrete, vacuum concrete, Ferro cement, Fibre reinforced concrete, Polymer concrete, self compacting concrete, shotcrete, grouting, Rubble concrete, Resin concrete, Heat resistance concrete, mass concrete, temperature control in mass concrete.

Reference

Concrete Technology by M L Gambhir
Concrete Technology by M S Shette
Properties of Concrete by A M Neville
Concrete Technology by R S Vashney

List of Experiments

1. Prepare design mix rates for M20
2. Slump test for workability
3. Compaction factor test for workability
4. Compressive strength test by cubes
5. Compressive strength test by cylinders
6. Split tensile test by cylinder
7. Flexural strength test
8. Study effect of fly ash on strength of concrete.
9. Study effect of time on strength of concrete.
10. Study effect of type of cement on strength of concrete
11. Study effect of chloride attack on strength of concrete
12. Study shrinkage & creep of concrete
13. Stress-strain analyses of concrete

B.Tech (Civil Engg.)
VI Semester
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 -Prandle, Terzaghi, Balla, Skempton, Meyerh of 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 tilts and shifts, 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 stabilisation : Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical-stabilisation and sabilisation 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.

LIST OF EXPERIMENTS

1. Indian Standard Light Compaction Test/Std. Proctor Test
2. Indian Standard Heavy Compaction Test/Modified Proctor Test
3. Determination of field density by Core Cutter Method
4. Determination of field density by Sand Replacement Method
5. Determination of field density by Water Displacement Method
6. The corifiled Compression Test
7. Triaxial compression test
8. Lab. Vane Shear test
9. CBR Test
10. Demonstration of Plate Load Test SPT & DCPT

Reference Books :--

1. Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
2. Soil Mechanics & Foundation Engg. by B.C. Punmia - Laxmi Publiscations Delhi
3. Modern Geotech. Engg. by Dr. Alam Singh-IBT Publishers Delhi.
4. Geotech. Engg. by C.Venkatramaiah-New AGe International Publishers, Delhi
5. Found. Engg. by GALeonards McGraw Hill Book Co. Inc.
6. Relevant IS Code

B.Tech (Civil Engg.)
VII Semester

Advanced Structural Design –(RCC)

Unit - I
Design of Multi-story Buildings - Sway and non-sway buildings, Shear walls and other bracing elements.

Unit II
Earth Retaining Structures: Cantilever and counter fort types retaining walls.

Unit - III
Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks,Overhead tanks: square, rectangular, circular & intze tanks.

Unit - IV
Silos and Bunkers

Unit - V
T-beam & Slab bridges- for highway loading (IRC Loads).
Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit State Design.

Suggested Books: -
1. R.C.C. by O.P. Jain Vol. II
2. R.C.C. by B.C. Punmia
3. Essentials of Bridge engineering – D.J. Victor
4. Bridge Engineering - Ponnuswamy
5. Advanced R.C.C. Design by N.K. RAJU
6. N.Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill, New Delhi.
7. Pre stresses concrete – T.Y. Lin

B.Tech (Civil Engg.)
VII Semester

Water Resource Engineering II

Unit - I
Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.

Unit - II
Earth and Rock fill dams :
Earth Dams: Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.
Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.
Spillways : Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.

Unit - III
Energy dissipatiors and gates : Principles of energy dissipation Energy dissipators based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works, syphon aquaduct.

Unit - IV
Hydropower Plants: Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.

Unit – V
Reservoir Sedimentation: Soil erosion and sedimentation, Types of sediment loads, Factors effecting reservoir sedimentation, Annual sediment inflow, Estimation of Sediment load, Useful Life of reservoir, Trap efficiency, Brune's Curve, Measures to control reservoir sedimentation, Economics of various measures.

Reference Books: -
1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
2. Hydroelectric Hand Book by Creager
3. Hydraulic Structures by Varshney
4. Irrigation & Water Power Engg. by Punmia & Pandey
5. Water Power Engineering by Dandekar

Advanced Structural Design- (Steel)

Unit – I
Plate girder bridges (Riveted and welded)

Unit – II
Trussed girder bridges for railways and highways (IRC & IRS holding). Bearings for bridges.

Unit – III
Water Tanks: Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

Unit - IV
Chimneys: Guyed and self supporting steel stacks.

Unit – V
Bunkers, Silos & Towers

Reference Books :-
1. Design of Steel Structures – Ramammutham
2. Design of Steel Structures – Punia
3. Steel Str. by Ramchandra Vol II
4. Steel Str. by Arya & Ajmani
5. Design of steel structures – L.S. Negi

B.Tech (Civil Engg.)
VII Semester

(Opt any one of the following)

(i) Rock Mechanics

Introduction, Importance and application of rock mechanics to engineering problems; Classification, Lithological classification of rocks, Engineering classification of intact and fissured rocks, Classification of fissures, joints and faults; Engineering properties of rocks; Laboratory and site measurements; Definition of stress in rock, Simple methods of determining in-situ stresses, Borehole over covering technique, Bore hole deformation gauges, Evaluation of rock stresses anddeformation around tunnels; Simple methods of tunnel design; Stability of rock slope, Modes of failure in rock mass, Analysis by simple field Bishop's method and use of Hoek's chart; Foundations on rocks, Limit equilibrium methods, Plastic equilibrium of foundations, Elastic solutions for loading and excavation of foundations, Consideration of uplift pressures; Methods of improving the properties of rock masses.

Suggested Books:

1. Goodman, R.E. (1989), 'Introduction to Rock Mechanics', John Wiley, Chichester.

2. Hudson, J.A. and Harrison, J.P. (2000), ' Engineering Rock Mechanics',

Pergamon Press, Amsterdam.

3. Roberts, A. (1977)., 'Geotechnology', Pergamon Press, England.

4. Stagg, K.G. and Zienkiewicz (1968)., 'Rock Mechanics in Engineering Practice',

John Wiley and Sons, London.

(ii) Water Power Engineering

Water power utilization principles, power from flowing streams, demand for power, role of storage and pondage in water power development, firm power and secondary power. Types of water power developments : Run-off river, storage, pumped storage, tidal and others, characteristics and layout of low, medium and high head hydropower developments. Conveyance of water : Channels, Penstocks, flumes and tunnels. Surges in open channels and water hammer and surges in closed conduits following rapid load changes in the hydro-power plant. Forebays and surge tanks. Water turbines : Selection of water turbines, scroll castings and draft tubes, Speed regulation and governing of turbines. Power house : Types of power house, substructure and superstructure. General arrangement and space requirements for standard power house facilities.

Suggested Books:

1. W.P. Creager and J.D. Justin, 'Hydro-electric Hand Book', John Wiley.

2. M.M. Dandekar and K.N. Sharma, 'Water Power Engineering', Vikas

Publishing House, New Delhi.

3. P.N. Modi, 'Irrigation, Water Resources and Water Power Engg.', Standard Book

House, New Delhi.

(iii) Analysis and Design of Pavements

Analysis of Pavements : Pavement Types, Design Factors, Equivalent Single Wheel and Axle Loads, Stresses in Flexible and Rigid Pavements. Design of Pavements : Design of Flexible Pavements – Group Index Method, CBR Method, California Resistance Value Method, Triaxial Method, Burmisters Method, McLeod's Method, IRC Method, Analytical Methods, Design of Rigid Pavements – PCA Method, IRC Methods, Design of Dowel and Tie Bars. Overlay Design : Structural and Functional Distress in Pavements, Flexible and Rigid Pavement Overlay Design, IRC, TRRL, Asphatt Institute Method and Analytical Methods.

Suggested Books:

1. Yoder, E.J. and Witezak, M.W., 'Principles of Pavement Design', John Wiley & Sons.

2. Yang, H. Huang, 'Pavement Analysis and Design', Prentice-Hall, New Jersey.

3. Teng, 'Functional Designing of Pavements', McGraw Hill.

4. E.J. Yoder, 'Principles of Pavement Design', John Wiley & Sons, Inc., New York.

5. Chakraborty and Das, 'Principles of Highway Engineering', Prentice Hall of India, New Delhi.

(iv) Environmental Pollution and Control

Different sources of pollution: Important cases for atmospheric, hydrospheric and land pollution and related control strategies.Water-borne, air-borne and vector-borne common diseases – Transmission modes and control measures. Excreta disposal in unsewered areas- various options and their selection. Noise pollution and engineering approaches for its abatement. Environmental Impact Assessment and Auditing: Few case studies.

Suggested Books:

1. Salvato, 'Environmental Sanitation'.

2. Canter , 'Environmental Impact Assessment' .

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3. Peavy, H.S., Rowe D.R. and Techobanoglous, G. 'Environmental Engg'.

4. Sincero and Sincero. 'Environmental Engg. – A Design Approach.' Masters

G.M. Environmental Science and Engg.

B.Tech (Civil Engg.)
VIII Semester

(Opt any one of the following))

(i) Elasticity and Experimental Stress Analysis

Theory of Stress : Stress components, Equilibrium equations, Stress transformation, principal stresses, Boundary conditions. Theory of Strain : Strain components, Strain transformation, Principal Strain, Compatibility. Stress-strain relationship, Generalized Hookes law, Strain-energy, Uniqueness theorem, St. Venant's principle. Plane problems in cartesian and polar coordinates, Stress function, Axisymmetric problems, stress concentration. Stress and strain measurements, different types of strain gauges, rosettes, Wheat Stone bridge, circuit for simple and multiple strain gauges.

(ii) Structural Dynamics

Vibration of Discrete Systems: Free and forced vibrations of single and multi-degree freedom systems, Damping and Forcing functions, Determination of frequencies and mode shapes, Orthogonal relationship of principal modes, Duhamel's integral, Stepby- step response. Calculation and Response spectra. Vibration of Continuum Systems. Earthquake resistant design of structures and IS recommendations.

(iii) Advanced Concrete Technology

Constituent materials and their properties, types of cement, fresh concrete, workability; strength, elasticity and fracture of hardened concrete : Time dependent properties of concrete, durability of concrete ; Concrete admixtures, mix design methods ; Manufacture and processes ; Codal provisions ; Special concretes.

(iv) Advanced Numerical Methods

Linear Algebra: Matrices, Matrics decomposition: LU decomposition, Cholesky decomposition, spectral decomposition, Matrix Eigen-value problem, Gerchgorin's theorem, Eignenvalue by iteration, generalized inverse of a matrix, solution of linear system by decomposition method, Jacobi method. Nonlinear system of equations: Newton's method, Powel Hybrid method. Differential equations: Generalised characteristic value problems, phase plane and critical points, stability and phase plane methods in nonlinear equations. Boundary value problems, mixed boundary conditions, boundary conditions at infinity, nonlinear boundary value problems, linear eigen value problems. Partial differential equations: Parabolic, elliptic and hyperbolic partial differential equations subject to Diritechlet, Neumann (or flux) and mixed (or Robin or radiation) boundary conditions, Navier Stock's equation. Approximate Analytic methods: Variational methods, weighted residual methods – Galerkin's method, collocation method, Functional, quadraic functionals. Numerical Integration – Gauss Legendre, Quadrature, Error Analysis, Convergence of solution. Finite element and Boundary element method. Software like MATHEMATICA and MATLAB in addition to programming languages C and C++. Application towards plane stress and plane strain two dimensional problems.

(v) Earthquake Resistant Design of Structures
Aseismic Design of Structures. Philosophy and principles of earthquake resistance design – Strength and stiffness, ductility design and detailing, design of energy absorbing devices, concepts of seismic base isolation and seismic active control. Building forms and architectural design concepts – Horizontal and vertical eccentricities due to mass and stiffness distribution, structural redundancy and setbacks. Equivalent static lateral earthquake force on building (IS : 1893). Equivalent static method : Seismic coefficients–evaluation, estimation of fundamental time period, base shear and its distribution, Vulnerability Atlas. Use of codes with reference to Masonry Buildings like IS : 4326, IS : 13828, IS : 13827. Use of codes of RC and steel structures like IS : 13920. Detailing of reinforcement and joints. Restoration and Retrofitting – Evaluation (Seismic qualification) of existing buildings – Aging, weathering, development of cracks, improper load path, asymmetry. Materials and equipments for restoration and retrofitting. Methodologies for retrofitting – For walls, roofs, slabs, columns and foundation of building in stones, brick or reinforced concrete structures.

Suggested Books:
1. James L. Stratta, 'Manual of Seismic Design', Pearson Education.
2. Anil K. Chopra, 'Dynamics of Structures', Pearson Education.