DIPLOMA IN CIVIL ENGINEERING
(DAY COURSES)

(REVISED SYLLABUS w.e.f 2019)

UNIVERSITY POLYTECHNIC
FACULTY OF ENGINEERING & TECHNOLOGY
JAMIA MILLIA ISLAMIA
NEW DELHI – 110 025

First Semester

S.NO	Code No	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods/ Week
Theory Courses							
1.	DCES-101	Communication Skills-I	4	40	60	100	4
2.	DCEP-102	Applied Physics	4	40	60	100	4
3.	DCEC-103	Applied Chemistry	4	40	60	100	4
4.	DCEM-104	Applied Mathematics-I	4	40	60	100	4
5.	DCE-105	Applied Mechanics	4	40	60	100	4
Practical Courses							
1.	DCEP-112	Applied Physics	2	30	20	50	2
2.	DCEC-113	Applied Chemistry	2	30	20	50	2
3.	DCE-115	Applied Mechanics	2	30	20	50	2
4.	DME-116	Workshop Practice	2	30	20	50	3
Total			**28**	**320**	**380**	**700**	**29**

Second Semester

S.NO	Code No	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods/ Week
Theory Courses							
1.	DCEM-201	Applied Mathematics-II	4	40	60	100	4
2.	DEE-202	Basic Electrical Engineering	4	40	60	100	4
3.	DME-203	Elements of Mechanical Engineering	4	40	60	100	4
4.	DCE-205	Surveying-I	4	40	60	100	4
5.	DME-206	Engineering Drawing-I	4	40	60	100	4
Practical Courses							
1.	DEE-212	Basic Electrical Engineering	2	30	20	50	2
2.	DME-213	Elements of Mechanical Engineering	2	30	20	50	2
3.	DCE-215	Surveying-I	2	30	20	50	2
4.	DME-216	Engineering Drawing-I	2	30	20	50	3
Total			**28**	**320**	**380**	**700**	**29**

Third Semester

S.NO	Code No	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods/ Week
Theory Courses							
1.	DCE-301	Building Construction	4	40	60	100	4
2.	DCE-302	Irrigation Engineering	4	40	60	100	4
3.	DCE-303	Surveying - II	4	40	60	100	4
4.	DCE-304	Hydraulics	4	40	60	100	4
5.	DCA-305	Computer Application	4	40	60	100	4
Practical Courses							
1.	DCE-311	Building Construction	2	30	20	50	2
2.	DCE-313	Surveying - II	2	30	20	50	3
3.	DCE-314	Hydraulics	2	30	20	50	2
4.	DCA-315	Computer Application	2	30	20	50	2
Total			**28**	**320**	**380**	**700**	**29**

Fourth Semester

S. No	Code No	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods/ Week
Theory Courses							
1.	DCES-401	Communication Skills II	4	40	60	100	4
2.	DCE-402	Concrete Technology	4	40	60	100	4
3.	DCE-403	Theory of Structures	4	40	60	100	4
4.	DCE-404	Environmental Engineering-I	4	40	60	100	4
5.	DCE-405	Construction Materials	4	40	60	100	4
Practical Courses							
1.	DCE-412	Concrete Technology	2	30	20	50	2
2.	DCE-413	Theory of Structures	2	30	20	50	2
3.	DCE-414	Environmental Engineering-I	2	30	20	50	2
4.	DCE-416	Civil Engineering Drawing ï I	2	30	20	50	3
Tota l			**28**	**320**	**380**	**700**	**29**

Fifth Semester

S. No	Code No	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods/ Week
Theory Courses							
1.	DCE-501	Soil Mechanics & Foundation Engineering	4	40	60	100	4
2.	DCE-502	Design of R.C.C. Structures-I	4	40	60	100	4
3.	DCE-503	Analysis of Structures	4	40	60	100	4
4.	DCE-504	Surveying ï III	4	40	60	100	4
5.	DCE-505	Constr. Management & Accounts	4	40	60	100	4
Practical Courses							
1.	DCE-511	Soil Mechanics & Foundation Engineering	2	30	20	50	3
2.	DCE-514	Surveying -III	2	30	20	50	3
3.	DCE-515	CAD in Civil Engg Practice	2	30	20	50	2
4.	DCE-516	Civil Engineering Drawing. - II	2	30	20	50	3
5.	DCE 520	Survey Camp	1	25	-	25	-
Total			**29**	**345**	**380**	**725**	**31**

Sixth Semester

S. No	Code No	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods/ Week
Theory Courses							
1.	DCE-601	Transportation Engineering	4	40	60	100	4
2.	DCE-602	Design of Steel Structures	4	40	60	100	4
3.	DCE-603	Estimating & Costing	4	40	60	100	4
4.	DCE-604	Design of R.C.C. Structures-II	4	40	60	100	4
5.	DCE-605	Environmental Engineering-II	4	40	60	100	4
Practical Courses							
1.	DCE-611	Transportation Engineering	2	30	20	50	2
2.	DCE-615	Environmental Engineering-II	2	30	20	50	2
3.	DCE-620	Project	8	120	80	200	6
4.	DCE-630	Industrial Training & Visits	1	25	-	25	-
Total			**33**	**405**	**420**	**825**	**30**

NOTE: Project Topics (DCE 620) shall be assigned to the students at the commencement of 5th Semester.

COMMUNICATION SKILLS -I
DCES-101

UNIT	Topic	Marks
I.	Reading *Comprehension (for beginners)*	10
II.	Grammar *a. Tenses and the voice* *b .Vocabulary*	20
III.	Structure *a. Sentence Formation* *b. Word Formation*	10
IV.	Writing - I *a.Report Writing* *b.Curriculum Vitae*	10
V.	Writing - II *a. Application* *b. Business Letters*	10

APPLIED PHYSICS
DCEP-102

UNIT- I

Electrostatics :- Coulombôs law, electric field and potential due to a point charge and a number of charges, potential difference between two points, equipotential surfaces, electric field at a point due to a uniformly charged thin sheet, capacitor, capacitance of a parallel plate capacitor, energy stored in a capacitor, combination of capacitors(series and parallel).

D.C. Circuits:- Kirchhoffôs law, application of Kirchhoffôs law to the wheat-stone bridge, post office box, meter bridge and potentio meter. Heating effect of current, heat produced by electric current in a conductor and Joules law of electrical heating. Determination of óJô by electrical method.

UNIT- II

Electromagnetism:- Motion of charge particles in uniform magnetic and electric field, Biot-Savart law, magnetic field around a current carrying conductor, at the centre of a circular loop and at any point on the axis of circular loop, force experienced by a moving charge and a current carrying conductor in a uniform magnetic field, Torque: on current loop, force between two parallel current carrying conductors, definition of an ampere, principle and working of a moving coil galvanometer, conversion of galvanometer into ammeter and voltmeter.

UNIT- III

Expansion of solids:- Concept of linear expansion (Ŭ), superficial expansion (ɓ) and cubical expansion (ɔ). Relation between (Ŭ), (ɓ) and (ɔ); Experimental determination of coefficient of linear expansion (Ŭ), Searleôs apparatus.

Heat Transfer:- Modes of heat transfer, coefficient of thermal conductivity and its determination by Searleôs and Leeôs disc methods, thermal conduction through compound media (both series and parallel).

UNIT- IV

Geometrical optics:- Refraction through a prism, lens formula; principle of working and magnifying power of astronomical telescope and microscope (simple and compound).

Wave Optics:- Huygensôs principle, reflection and refraction of a wave at a plane surface, refraction and interference of light waves; Youngôs experiment; Newtonôs ring, application of interference.

UNIT- V

Acoustics and Ultrasonics:-Reflection, and absorption of sound waves by materials; definition of pitch, loudness ,quality and intensity of sound waves, unit of intensity(bel and decibel);Echo and reverberation and reverberation time, control reverberation time. Acoustics insulation (qualitative treatment only of reverberation).Production of ultrasonic waves by magnetostriction and piezoelectric effect, detection and properties of ultrasonic; application to drilling, cold welding, cleaning, flaw detection and exploration (sonar).

Reference Books:

1. Basic Applied Physics by H.R. Meena, Neeraj Pant, Arjun Singh & Har Lal
2. Applied Physics by R.K. Gaur

APPLIED CHEMISTRY
DCEC-103

UNIT -I: Problems based on Volumetric and Gravimetric analysis

1. Molecular mass, mole, weak and strong electrolytes Equivalent mass and Gram-equivalent
2. Strength, Normality and Molarity of a solution, Normality equation
3. Problems based on Volumetric and Gravimetric analysis.

UNIT - II : Analysis of Water

1. Impurities in water, Hardness, Units of Hardness and Calcium carbonate equivalent.
2. Estimation of chloride ion, free chlorine, Dissolved Oxygen, Alkalinity and Hardness

UNIT –III : Treatment of Water

1. Quality of water for domestic and Boiler feed
2. Lime-Soda Process, Zeolite Process and Ion-Exchange Process for softening of water
3. Filtration, Sedimentation and Disinfection of water in Waterworks.

UNIT –IV : Corrosion and Lubricants

1. Dry and Wet corrosion, Galvanic corrosion, Concentration corrosion, Pitting corrosion and Stress corrosion.
2. Protection of corrosion by Proper designing, Alloying, Cathode protection and Coating methods
3. Types and Mechanism of Lubricants, Characteristics of lubricants like Viscosity, Acid Value, Saponification value, Cloud point, Pour point, Flash point and Fire point.

UNIT –V: Polymerization, Metals and Alloys

1. 1. Polymers: Classification, Types of polymerization reactions, Biodegradable Polymers, Examples.
2. Cast iron, Steel and Heat treatment
3. Necessity of making alloys, Composition, properties and uses of Brass, Bronze, Gun metal, Invar and Duralumin

Text Books:

1. ENGINEERING CHEMISTRY BY S.S. DARA
2. ENGINEERING CHEMISTRY BY SHIKHA AGRAWAL

APPLIED MATHEMATICS-I
DCEM-104

UNIT I ALGEBRA

Arithmetic progression, its nth term, sum to n terms. Geometric progression, its nth term, sum to n terms and sum of infinite terms. Binomial theorem (without proof) for any index, General and middle term, terms independent of x, First and second binomial approximation.

UNIT II DETERMINANTS

Determinants (upto 3rd order only), minors, co-factors, Properties of determinants, solution of linear simultaneous equations in three variables by Cramerôs rule.

UNIT III MATRICES

Definition and examples of matrices, types of matrices, basic operations, equality of matrices, addition, multiplication and scalar multiplication of matrices, transpose of a matrix, symmetric, skew-symmetric matrices, singular and non-singular matrices, cofactor matrix, adjoint of a matrix, inverse of a matrix, solutions of simultaneous equations in three variables by matrix inverse methods.

UNIT IV CO-ORDINATE GEOMETRY OF TWO DIMENSIONS

Definition of locus with problems, Equations of straight lines in various forms. Angle between two lines, Perpendicular distance formula, Conic sections, Circle, Parabola, Ellipse and Hyperbola.

UNIT V VECTORS

Scalar and vectors, addition and subtraction of vectors and their simple applications, multiplication of vector by a scalar, Scalar and vector product of two vectors. Scalar product of three vectors, Geometrical interpretation.

Text/Reference Books:

1. A text Book of Applied Mathematics, Vol. I & II by Dr. Neeraj Panth
2. Applied Mathematics, Vol. I & II by Dr. Hari Arora, A. Sachdev.

APPLIED MECHANICS
DCE-105

UNIT- I

Introduction: Concept of engineering mechanics, its importance and necessity, giving suitable examples on bodies at rest and motion, concept of rigid bodies.

Laws of forces: Principles of mechanics- superposition, transmissibility etc, types of forces, systems of forces, principles of forces, resultant of forces. Parallelogram law, triangle law, polygon law of forces, resolution of forces, free body diagram, equilibrium force and its determination, Lamiôs theorem.

UNIT- II

Moments: Concept of moment, laws of moment, Varignonôs theorem. Application of moment to simple mechanism, resultant of parallel/ non-parallel forces, reaction at support in statically determinate beam due to point load, u.d.l and triangular load.

UNIT- III

Centre of gravity: Centre of gravity and centroid of regular bodies (cone, cylinder, sphere and hemisphere), areas (rectangle, circle and triangle), composite bodies, composite areas, remainder.

Moment of Inertia: Moment of inertia of Lamina- rectangular, circular (solid/hollow), triangular, parallel axis theorem, perpendicular axis theorem.

UNIT- IV

Laws of motion: Newtonôs laws of motion, momentum, impulse, torque, linear and angular motion.

Circular motion: centripetal and centrifugal force.

Work, Power & Energy: Definition of terms, simple numerical problems

UNIT- V

Friction: Concept of friction, laws of friction- static and dynamic, limiting friction, coefficient of friction, angle of friction. Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane.

Simple lifting Machines: Concept of machine, mechanical advantage, velocity ratio and efficiency of a machine, their, relationship , laws of machine, Simple machine winch crab, wheel and axle, simple screw jacks. System of pulley ï first, second and third system of pulleys.

Reference Books:

1. A Text Book of Engineering Mechanics by A.R Basu, Dhanpat Rai & Co., New Delhi
2. A Text Book of Engineering Mechanics by R.K. Khurmi, S. Chand & Co., New Delhi
3. Applied Mechanics by A.K. Upadhay, S.K. Kataria & Sons, New Delhi

APPLIED PHYSICS PRACTICAL
DCEP- 112

List of Experiments:

1. To find the volume of metal used in a hollow cylinder closed at one end using vernier calipers.
2. To Measure Density of a Wire using Screw gauge
3. To Measure Radius of Curvature of a Lens, Mirror using Spherometer.
4. To Determine Refractive Index of Glass using Prism.
5. To find the acceleration due to gravity using simple pendulum and to draw ă-T^2 graph and hence to read the length of the secondôs pendulum.
6. To determine the focal length of a convex lens by two-pin method.
7. To plot a graph between the distance of the knife edge from the centre of gravity and the time period of a bar pendulum and to determine its radius of a gyration about the centre of gravity.
8. To find force constant of a Helical Spring by plotting a graph between load and extension.

REFERENCE BOOKS

Lab Manual in Physics Vol-I & II, R.S. Mittal & S. Singal

APPLIED CHEMISTRY PRACTICAL
DCEC-113

List of Experiments:

1. To determine the purity percentage of oxalic acid in a given impure mixture.
2. To analysis a mixture of NaOH and KOH (given a solution contacting 2.5g mixture of NaOH and KOH per litre)
3. To estimate the calcium and magnesium hardness in the given water sample.
4. To estimate the Chloride ion (Cl^-) in the given water sample.
5. To estimate the free Chlorine (Cl_2) in the given water sample.
6. To estimate the dissolved Oxygen (D.O) in the given water sample.
7. To estimate the Alkalinity in the given water sample.
8. To estimate the temporary, permanent and total hardness in the given water sample by EDTA method.
9. To determine the viscosity of a lubricating oil by Redwood Viscometer.
10. To determine the moisture percentage in a given coal sample.

APPLIED MECHANICS PRACTICAL
DCE-115

List of Experiments:

1. To verify parallelogram law of forces with the help of Universal Force Table Apparatus.
2. To verify polygon law of forces with the help of Universal force Table Apparatus.
3. To verify parallelograms law of forces with the help of Gravesands Apparatus.
4. To verify triangular law of forces with the help of Gravesands Apparatus.
5. To verify Lamiôs theorem with the help of Gravesands /Universal Force Table Apparatus.
6. To verify the law of moments by Bell Crank Level Apparatus.
7. To verify the law of moments by Rotating Disc Apparatus.
8. To determine the coefficient of friction between wood and glass surfaces by using Horizontal Planer Friction Apparatus.
9. To determine the coefficient of friction between wood and glass surfaces by using an Inclined Plane Friction Apparatus.
10. To determine the personal horse power by Rope Brake Dynamometer Apparatus.
11. To determine the mechanical advantage, velocity ratio& efficiency of a Single Purchase Winch Crab Machine and plot graph between(a) Load vs Effort and (b) Load vs Efficiency.
12. To determine the mechanical advantage, velocity ratio & efficiency of a Double Purchase winch Crab Machine and plot graph between (a) Load vs Effort and (b) Load vs Efficiency .
13. To determine the mechanical advantage, velocity ratio & efficiency of a Worm and Worm Wheel and plot graph between (a) Load vs Effort and (b) Load vs Efficiency.
14. To Determine the mechanical advantage, velocity ration & efficiency of a Differential Wheel and Axle and plot graph between (a) Load vs Effort and (b) Load vs Efficiency.
15. To determine the mechanical advantage, velocity ratio & efficiency of a Simple Screw Jack and plot graph between (a) Load vs Effort and (b) Load vs Efficiency.

WORKSHOP PRACTICE
DME-116

Carpentry shop:

Introduction of tools.Making of various joints- Cross lap joint, Half lap joint, Mortise and tenon joint, Dovetail joint.

Fitting shop:

Introduction of tools

Cutting and filing practice as per drawing

Drilling

Smithy Shop:

Introduction of tools

Hot working and cold working

Making of U clamp, fan hook

Making of sheet metal Joints

Welding Shop: A/C welding and gas welding

Preparation of lap joint and but joints

Preparation of Oxy acetylene gas welding joints

APPLIED MATHEMATICS-II
DCEM-201

UNIT-I DIFFERENTIAL CALCULUS

Limit and continuity (without problems), Differentiation of functions by First Principle, Differential of sum, product and quotient functions, Differential of a function of a function (Chain rule), Logarithmic differential, Higher order derivatives.

UNIT-II INTEGRAL CALCULUS

Indefinite integral, Integration of a function, standard formulae, the fundamental laws of integration, Integration by substitution method, by parts method and partial fractions method.

UNIT-III APPLICATIONS OF CALCULUS

Maxima and minima, Tangent and normal, Evaluation of definite integral. Properties of definite integral, Area bounded by a curve between two ordinates and x-axis.

UNIT-IV DIFFERENTIAL EQUATIONS

Differential equation, Order and degree of differential equations, Solution of differential equations of first order and first degree, variable separable, Homogeneous and linear differential equations, Solution of linear differential equations of 2nd order with constant co-efficient.

UNIT-V COMPLEX NUMBERS

Complex Number, representation of a complex number (Argand Diagram), Complex number in rectangular, polar and exponential forms, Conversion from one form to another form. De Moiverôs Theorem, Roots of complex number.

Text/Reference Books:

1. A text Book of Applied Mathematics, Vol. I & II by Dr. Neeraj Panth
2. Applied Mathematics, Vol. I & II by Dr. Hari Arora, A. Sachdev.

BASIC ELECTRICAL ENGG
DEE-202

UNIT –I DC CIRCUITS:
Basic concepts of charge, current, voltage, resistance, power ,energy and their units, conversion of units of work ,power and energy from one form to other, ohmôs law, resistances in series and parallel, laws of resistance, grouping of cells in series, parallel and mixed combination, simple numerical problems.

UNIT –II NETWORK THEOREMS:
Meash and Nodal Analysis, Superposition Theorem, Thevenin's Theorem, Nortonôs Theorem, Maximum Power Transfer Theorem, Conversion of Star to Delta and vice versa, Numerical Problems

UNIT -III ELEMENTS OF GENERATION TRANSMISSION & DISTRIBUTION SYSTEM:
Elementary block diagram of Thermal, Hydro, Nuclear & Power Diesel Plant and its brief description, pictorial diagram of 3-phase Transmission and Distribution system, showing transformer, primary & secondary transmission line and all other accessories, simple numerical problems.

UNIT -IV ARRANGEMENT OF SUPPLY SYSTEM & DISTRIBUTION SYSTEM:
Supply system from pole to distribution box, function of series line, energy meter, main switch and distribution box, High & low voltage distribution system, Identification of 3-phase, neutral & earth wire on voltage distribution system; brief description on Polyphase circuit.

UNIT -V: DOMESTIC INSTALLATION & SAFETY MEASURES:
Distribution between light and fan circuits, single phase power circuits, sub circuits, various accessories& parts of installation, types of earthing, functions of earthing, IE rules for electric installation & wiring, common safety.

ELEMENTS OF MECHENICAL ENGINEERING
DME -203

UNIT – I TRANSMISSION OF POWER:

Different modes of power transmission Belt drive : Material of belt, flat belt, V belt open and cross belt device, length of belt (without derivation),Velocity ratio, slip, angle of contact, derivation of tension ratio for flat belt., Power transmitted through belts.
Advantage of V-belt over flat belt. Simple numerical problems. $T_1/T_2=e^{\mu\emptyset}$
Chain Drive: Classification Clutch: Principle of clutch, comparison between chain and belt drive.
Pulleys: Introduction, types of pulleys.
Gears: Spur, helical, bevel, spiral, worm gear, rack and pinion, Gear trains: simple & Compound gears train and simple numerical problems.

UNIT-II

Steam generators: Introduction, classification, Differentiation between fire tube and water Tube boilers. Simple vertical boiler, Babcock & Wilcox boiler, Cocharan boiler, Boiler accessories and mountings,
Turbines: Introduction & classification of steam turbine, concept of reaction and Simple impulse turbine, comparison between impulse & reaction turbines, losses in steam turbine.
Hydraulics turbine: Classification, construction, working of pelton wheel, Francis turbine and application of reaction and impulse turbine.

UNIT –III Internal Combustion Engines:

1. Classification & application of I.C. engine commonly used spark ignition engine and compression engines.
2. Working principles of two stroke petrol and diesel engine
3. Ignition system in petrol engine.
4. Simple carbonator
5. Cooling and lubrication system of IC engines.

Lubricants: Introduction, method of lubrication: Petrol System, mixed, Splash, force system,

UNIT-IV

Pumps: Construction and Working of reciprocating, centrifugal and gear pump,
Air compressor: Working of various type of air compressor and their application
Material Handling : Tower and bridge crane, jaw Crushers, Hydraulic jack and hydraulic Lift.

UNIT-V

Refrigeration and Air Conditioning System: Introduction, unit of refrigeration, coefficient of performance, vapour compression cycle, simple vapour absorption cycle. Applications.
Air conditioning System: Purpose of air conditioning, Factor affecting air conditioning , Some definition relating to psychometric parameters like dry bulb temp., wet bulb temp., humidity etc. Window air conditioner and desert cooler.

SURVEYING –I
DCE 205

UNIT - I

Introduction: Concept and purpose of surveying, Division of surveying- Plane and Geodetic surveying, principles of surveying, classification of survey, Linear and angular measurements used for the purpose.

Chain surveying: Principle, purpose and suitability of chain surveying, equipments used in chain surveying. Different types of chains, tapes, ranging rods, arrows, pegs mallet, cross-staffs, Indian optical square, and line ranger- their construction and use, Direct and indirect ranging, chaining on flat and sloping ground. Reconnaissance survey, selection of stations, conducting chain survey over an area, recording the field data, plotting the chain survey, conventional signs. Obstacles in chain surveying erroneous length of chain, correction for measurements by erroneous length of chain, simple problems. Errors in chain surveying, permissible errors in chaining.

UNIT - II

Compass Surveying: Purpose, principle and suitability of compass surveying instruments used in compass surveying construction and working of prismatic and surveyors compass, temporary adjustment or use of prismatic compass setting and taking observations. Concept of bearing, systems of bearings, magnetic meridian, true meridian and arbitrary meridian, magnetic bearing, true bearing, arbitrary bearing whole circle and reduced bearing, fore and back bearing. Magnetic dip and declination. Local attractions, causes of local attraction, detection of local attraction, errors and corrections, problems on local attraction, Concept of traverse; open and closed traverse, traversing with a compass, calculation of included angles, calculation of bearing in a compass traverse. Check for open and closed traverse plotting traverse, graphical adjustment of closing errors, errors in compass surveying.

UNIT - III

Simple Levelling: Propose of levelling, concept and explanation of all terms connected with levelling work instruments used in levelling, principle and construction of Dumpy, IOP (Tilting) and automatic levels, types of levelling instruments, types of levelling staffs, Concept of line of collimation, axis of telescope, axis of bubble tube and vertical axis. Temporary adjustment of dumpy level, IOP level and automatic level. Methods of levelling. Concept of station, back sight, intermediate sight, foresight, height of instrument, reduced level, parallax, change point. Reduction of levels and maintenance of level field book, height of instruments method and rise and fall method with arithmetic checks, numerical problems.

UNIT - IV

Precise levelling:

Purpose of precise levelling problems on missing entries, longitudinal or profile levelling (L-Sectioning), Cross- Section levelling (X-Sectioning), reciprocal levelling, balancing of back sight and fore sight, Difficulties in levelling : Levelling across hill or hollow, levelling on steep slope (Up hill or down hill), staff very near the instrument, continuation of levelling across a tall wall, levelling across a pond or a lake too wide and levelling across a river. Effect of earthôs curvature and refraction. Error in levelling and precautions to minimize them. Permanent adjustment of dumpy level. Permissible error in levelling. Sensitivity of bubble tube.

UNIT - V

Constructional details and method of using Abney level, Ceylonôs Ghat tracer, Box Sextant, Tangent Clinometers or Indian pattern clinometers, digital planimeter. Calculation of areas by graphical method : Dividing the plan into triangles, graphical paper method and application of formula. Trapezoidal and Simpsonôs formula with numerical problems.

Text Books:

1. Surveying and Levelling Vol. I by B.C. Punmia, Laxmi Publication
2. Surveying, Vol. I by K.R.Arora, Standard Book House Publication

Reference Books:

3. Surveying and Levelling Vol. I by Duggal
4. Surveying and Levelling Vol. I by Sanjay Mahajan, Satya Prakashan Publication

ENGINEERING DRAWING- II
DME- 206

1. **Principle of Projections strictly in first angle projection**

   Projection of solids , such as Prism, Cube, Cylinder and Cones with axis perpendicular to horizontal plane or parallel to horizontal plane/vertical plane or both. Drawing 3 orthographic views of given objects (at least five objections). Identification of surfaces of drawn orthographic views from isometric object, Sketching practice of pictorial views from isometric objects.

2. **Sectional Views**: Need for sectional views ï cutting planes methods of representing sections, conventional sections of various materials, classification of sections, conventions in sectioning. Drawing of full section, half section, partial broken out sections, offset sections, revolved section and removed sections. Exercises on sectional views of different objects. Drawing of different conventions for materials in section conventional breaks for shafts pipes, rectangular , square, angular, channel, rolled sections .

3. **Isometric View :** Fundamentals of isometric projections (theoretical instructions). Free hand sketching of Isometric views from 2or 3 given orthographic views.

Reference Books.

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt Charotar Publishing House
2. A text book of engineering drawing by Surjit Singh published by DhanpatRai and Co. Delhi R.B. Gupta N.D Bhatt.
3. Engineering Drawing by PS Gill published by SK Kataria and sons. Delhi.

BASIC ELECTRICAL ENGINEERING PRACTICAL
DEE-212

List of Experiments:

1. To find out the power factor of Fluorescent tube with help of voltmeter, Ammeter and Wattmeter.
2. To find the power consumption of a given resistive load with the help of Voltmeter and Ammeter.
3. To Study the function and connection of a wattmeter and to measure the power of an iron press with it.
4. To control one lamp load from two different places (i.e.Staircase wiring system)
5. To control two lamps from three different places (i.e. Corridor system). Study of various types of domestic electric appliances ans their functions. Study of fluorescent tube circuit.
6. To study the connection of a single phase energy meter, main swith and D.B. box.

ELEMENTS OF MECHANICAL ENGINEERING PRACTICAL
DME-213

List of Experiments:

1. Study of the construction and working of simple vertical boiler.
2. Study of the construction and working of Cochran boiler.
3. Study of the construction and working of Babcock & Wilcox boiler.
4. Study of the construction and working of boiler mountings.
5. Study of the construction and working of boiler accessories.
6. Study of the construction and working of four stroke petrol engine.
7. Study of the construction and working of four stroke diesel engine.
8. Study of the construction and working of two stroke petrol engine.
9. Study of the construction and working of two stroke diesel engine.
10. Study of the construction and working of desert cooler.
11. Study of the construction and working of window air conditioner.
12. Study of different modes of power transmission.

SURVEYING–I, PRACTICAL
DCE-215

List of Experiments:

1. To range and to chain a given survey line.
2. To plot the features of the ground by taking perpendicular offsets from the chainline.
3. To observe fore and back bearing of different given lines by using a prismatic compass.
4. To do compass traversing and plot the traverse by meridian method. Show the closing error.
5. To do compass traversing and plot the traverse by included angle method. Adjust the closing error by graphical method.
6. To find out the elevations of different given stations with respect to a given Bench Mark by simple levelling. Take the Reduced Level (R.L.) of B.M. as 100m.
7. To find out the elevations of different given stations with respect to a given Bench Mark by differential levelling. Shift the instrument after third and sixth reading. Take the Reduced Level (R.L.) of B.M. as 100m.
8. To perform L-sectioning (Profile Levelling).
9. To perform Cross-sectioning.
10. To do Reciprocal Levelling.

ENGINEERING DRAWING -I
DME-216

UNIT -I Introduction:

a. **Drawing Instruments:** Drawing instruments, Sizes and layout of standard drawing sheets, Sizes of drawing boards.

b. **Lines, Lettering and Dimensioning :**

Different types of lines and freehand Sketching**,** Different types of lines in engineering drawing as per BIS Specifications**,** Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses.

UNIT -II Lettering techniques and Practice : Instrumental single stroke- vertical and inclined lettering of 3to 7mm height. Instrumental double stroke lettering of 35mm height in the ratio of 7:4 vertical.

UNIT -III Dimensioning: Necessity of dimensioning, terms and notations- methods and principles, dimensioning small components as in 4.2. below (mainly theoretical instructions), Dimensioning of overall sizes, circles thread holes, chamfered surfaces, angles tapered surface holes equally spaced on PCD counter sunk hole counter bored holes, cylindrical parts narrow. Space and gaps radii curves and arches chain and parallel dimensioning.

UNIT -IV Scale : Scales and their need & importance, definition of representative fraction(RF) find RF of a given scale, types of scales , construction of plain and diagonal scales.

UNIT -V Construction of curves such as ellipse, parabola, hyperbola, cycloid, epicycloids, hypocycloid and involutes.

BUILDING CONSTRUCTION
DCE-301

UNIT - I

Introduction: Definition of a building, classification of building based on occupancy & structure. Different parts of a building.

Foundation: Factors affecting selection of foundations. Average & safe bearing capacity of common soils. Types of foundations ï Shallow and deep. Shallow foundations: spread foundations for walls, masonry pillars and concrete columns stepped foundations, raft foundation, grillage foundation. Design for the width depth; and thickness of the concrete block. Pile foundation and its suitability, Classification of piles according to function. Classification of piles as per composition: timber, steel (pipe and sheet) and concrete(pre-cast and cast in situ). Franki and Simplex piles. Construction of foundations preparing foundation plan, setting out of foundation plan on ground. Excavation, Precautions to be observed for laying foundation.

Walls: Purpose of walls: Classification of walls-load bearing and non load bearing, classification of walls as per materials: concrete , pre-cast hollow concrete block, R.C.C and composite masonry walls. Brick masonry: definition of terms mortar, bond, facing backing, hearting, columns, pillars, jambs , reveals, soffit, plinth, plinth masonry, brick, header, stretcher, bat, queen closer, king closer, beveled closer, frog and quoin. Bond meaning and necessity : types of bond and their suitability (English, Flemish, Header and Stretcher). Sketches for 1, 1-1/2 and 2 brick thick wall in English bond . T-junctions and right corner junctions. Sketches for 1, 1-1/2 and 2 brick square pillars in English bond. Construction of brick walls-method of laying brick in walls, precautions observed in the construction of walls, method of bonding new brick work with old (Toothing, racking back and block bonding). Stone masonry ; glossary of terms : natural bed, bedding planes string course, carbol, cornice block-in-course, cramp drip stone, propping. Types of stone masonry : Rubble masonry : random and coursed, Ashlar masonry : Ashlar fine, Ashlar rough, Ashlar facing. Principles to be observed in construction of stone masonry walls.

Partition wall: constructional details, suitability and uses of brick, hollow blocks and glazed & wooden partition walls. Mortars. Preparation, use and average strength of cement, lime, lime cement, lime Surkhi, lime mud mortar. Scaffolding constructional details and suitability of masonsô and tubular scaffolding. Shoring and underpinning: Types & uses. Safety in construction of low rise and high rise buildings.

UNIT - II

Arches and Lintels: Meaning and use of arches and lintels. Glossary of terms used in arches and lintels abutment, pier, arch rig, intrados, soffit, extrados, Voussoiers, Springer, Springer line, crown key stone, skew back span, rise depth of an arch, haunch, spandrel , jambs, bearing thickness of lintels, effective span. Arches: Types of arches:

Semi circular, segmental, elliptical and parabolic, flat, inverted and relieving. Stone arches and their construction: Brick arches and their construction. Construction of R.C.C lintel (Pre-cast and cast ï in-situ)

Doors and windows: Glossary of terms used in doors used in doors and window. Doors: Names, Uses and sketches of: ledged and battened door, ledged, battened and braced door, framed and paneled doors, glazed and paneled doors. Louvered doors, flush doors revolving doors. PVC shutters, collapsible doors, rolling steel doors, side sliding doors. Doors frames (Steel, timber and concrete). Window-names, uses and sketches of fully paneled window , fully glazed window, metal windows, casement, dormer window, clearstory window, bay window and ventilators, sky light window frames, windows of different material (steel aluminum and wood).

UNIT - III

Floors: Ground floors: glossary of terms, floor finish topping, under layer, rubble filling and their purpose. Types of floor finishes, Cast in situ concrete flooring (monolithic bonding), Terrazzo tile

flooring , Terrazzo flooring. Timber flooring. PVC floor, ceramic floor, description with sketches of the methods of construction of the floor and their specifications. Floor polishing equipments, Suspended floors (upper floors) Flooring on RCC slab, flooring on RB slab.

Roofs: Glossary for pitched roofs batten, barge board, gable, hip valley, rag bolt, Types of roofs, concept of flat pitched hipped, arched and shell roofs. Simple steel roofs. Different types of steel roof trusses. Detail of steel roof connection including free and fixed. Roof covering in pitched roofs, Asbestos sheeting, big six Trafford sheets. Mangalore tiles, wooden singles. Method of arranging and fixing A.C. sheets. Drainage arrangement for pitched roofs. Flat roofs with arrangement of damp proofing and drainage.

Scaffolding, Shoring, Underpinning and Formwork: Scaffolding, types of scaffolding, shoring, types of shoring, underpinning, methods of underpinning, formwork or shuttering, requirements of a god formwork, types of formwork and shuttering or centring.

UNIT - IV

Damp Proofing: Dampness and its ill effects on brick plaster wooden fixture metal fixtures and reinforcement. Damage of aesthetic appearance. Damage to stored article and health. Source of dampness moisture penetrating the building from out side, e.g. rain water. Surface water ground moisture. Moisture entrapped during construction e.g. moisture in concrete masonry and plastering work etc. Moisture which originates in the building itself i.e. water in kitchen and bathroom etc. Damp proofing materials and their specifications. Rich concrete and mortar bitumen felts, bitumen, mastic asphalt, plastic etc. Method of damp proofing basement ground floors, plinth and walls, special damp proofing arrangements in bath rooms. W.C. and kitchen, damp proofing for roof and window sills. Plinth protection and aprons.

Stairs: Glossary of terms, staircase, windows, landing, stringer, balustrade, riser, tread, width of staircase , handrail nosing. Planning and layout of staircase. Relation between rise and tread, determination of width of stair, landing etc. Various types of layout : straight flight. Dog-legged, open well quarter turn, half turn (newel and geometrical staircase) bifurcated stair, spiral stairs.

UNIT - V

Surface Finishes: Plastering classification: grit finish, rough cost pebble dash plain plaster proportions of mortars used for different plasters, preparation of mortar, techniques of plastering and curing. Defects in plastering and repair work. Pointing- Different types of pointing mortar used and method of pointing. Painting preparation and application of paint on wooden, steel and plastered wall surface, white washing color washing distempering. Application of cement and plastic paint. Commonly used water repellent for exterior surfaces: Their names and application. Anti-termite treatment in building foundation floors. Wood work. Provision for expansion joints in building (foundation, floors, walls, roof , beams and slabs)

Maintenance of building: White washing. Distempering, cement painting. Painting a timber and steel surface. Replacement of glass panes. Re-polishing of terrazzo and mosaic flooring. Replacement of decayed timber and replacement of fittings. Easing of doors and windows. Repair or damaged part of flooring. Cleaning fire chimneys, gutters etc. Repair to worn out timber floor , polishing and waxing of timber floor, inspection of sanitary and electrical fittings and their repairs.

Building Planning: Site selection Factors to be considered for selection of site for residential commercial. Industrial and public buildings. Principles of building planning, arrangement of doors windows cup boards etc. for residential building. Ventilation of building as per BIS: 7662 in relation to sun and wind direction, rains, internal orientation& placement of room within the available area.

Reference Books:

1. Building Construction by S.C. Rungwala, Anand Charotar Book Stall
2. Building Construction by Sushil Kumar, Standards Publishers Distributors
3. A Text Book of Building Construction by Arora, SP and Bindra, Dhanpat Rai & Sons, New Delhi
4. SP-62 Hand Book of BIS, Bureau of Indian Standards, Manak Bhawan
5. IS-6313 Part 1,2,3, Bureau of Indian Standards, Manak Bhawan, Delhi

IRRIGATION ENGINEERING
DCE-302

Unit- I

Introduction: Definition of irrigation, necessity of irrigation, history of development of irrigation in India, Major Irrigation projects in India, sources of irrigation water, types of irrigation, advantages and disadvantages of irrigation

Rainfall and Run off: Definition of rain fall and run off, catchments area, Dickenôs and Rynbeôs formulas, Types of rain gauges (Automatic and non-automatic), Stream gauging.

Water Requirement of Crops: Definition of crop season, Duty, delta and base period, their relationship, crop ratio, overlap allowances, Gross command area, Culturable command area, Intensity of irrigation, water requirement of different crops- Kharif and Rabi.

Unit- II

Lift Irrigation: Types of wells- Shallow and deep well, aquifer types, ground water flow, construction of open wells and tube wells, Yield of an open/ tube well and problems, Methods of lifting water, Manual and mechanical devices, use of wind mills

Tube Well Irrigation: Introduction, occurrence of ground water, location and command, advantages of tube wells. Explanation of terms: water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers, Types of tube wells and their choice-cavity, strainer and slotted type, their method of construction, boring, installation of well assembly, development of well assembly, development of well, pump selection, installation and maintenance.

Unit- III

Flow Irrigation: Introduction, components & systems, perennial irrigation, different parts of irrigation canals and their functions, Sketches of different canal cross- sections, classification of canals according to their alignment, Design of irrigation canals- Chezyôs formula, Manningôs formula, Kennedyôs and Laceyôs silt theories and equations, comparison of above two silt theories, Critical velocity ratio, Various types of canal lining- Advantages and disadvantages.

Unit- IV

Canal Head Works: Definition, object, general layout, functions of different parts of head works, difference between weir and barrage.

Regulatory Works: Functions and explanation of terms used, cross and head regulators, falls, energy dissipaters, outlets- different types.

Cross Drainage Works: Functions and necessity of aqueducts, syphon, super passage, level crossing, inlet and outlet, constructional detail of the above.

Unit- V

Dams: Earthen dams- types, causes of failure, classification into masonry and concrete dams, labelled cross section of gravity dam, spillways.

Water Logging and Drainage: Definition, causes and effects, prevention and remedial measures and land reclamations, surface and sub-surface drains and their layout.

Reference Books:

1. Irrigation Engineering and Hydraulic Structures by Santosh Kumar and Garg, Khanna Publishers, New Delhi
2. A Text Book on Irrigation Engineering by R.P Singhal, Sighal Publications
3. Irrigation Engineering by J.L. Sharma, Satya Prakashan Publisher, New Delhi

SURVEYING -II
DCE-303

Unit- I

Simple Plane table Surveying: Concept and suitability of plane table surveying, equipments used, advantages and disadvantages, temporary adjustment of plane table, plain alidade and telescopic alidade. Operations of plane table, orientation by trough compass and by back sighting, comparison between them. Methods of plane table surveying: Radiation method, intersection method and traversing method, precautions in plane table surveying.

Unit- II

Precise Plane table surveying: Resection method of plane table; Resection by trough compass, back sighting, two point problem, three point problem by mechanical or tracing paper method & Besselôs graphical method, Lehmannôs method or trial and error method. Lehmannôs rules for interpolating the position of point more quickly. Strength of figures. Errors in plane table surveying. Testing and adjustment of plane table and its accessories.

Unit- III

Contouring: Concept of contours, purpose of contouring, contour interval and horizontal equivalent. Factors affecting contour interval, characteristics of contours. Methods of contouring; Direct and indirect. Use of contour map, interpolation of contours. Drawing cross section from a contour map. Marking alignment of a road railway and canal on a contour map, Computation of earth work and reservoir capacity from a contour map.

Unit- IV

Theodolite surveying: working of a transit vernier theodolite, Fundamental axes of a theodolite and their relations. Temporary adjustment of a transit theodolite, concept of vernier scale, least count and reading a vernier scale, concept of transiting, swinging, face left, face right and changing face, Measurement of horizontal and vertical angles, prolonging a line (forward and backward). Measurement of bearing of a line using a theodolite. Finding the height of an object by means of a theodolite when the base of an object is accessible and inaccessible.

Unit- V

Theodolite traversing: Traversing by included angles and deflection angle method, concept of co-ordinates. Balancing a traverse by Bowditchôs rule and transit rule. Plotting a traverse by Gales traverse table, solution of omitted measurements (One side affected). Errors in theodolite survey and precautions taken to minimize them. Limits of precision in theodolite traversing.

Text Books:

1. Surveying and Levelling Vol. I&II by B.C. Punmia, Laxmi Publication
2. Surveying, Vol. I & II by K.R.Arora, Standard Book House Publication

Reference Books:

3. Surveying and Levelling Vol. I&II by Duggal
4. Surveying and Levelling Vol. I&II by Sanjay Mahajan, Satya Prakashan Publication

HYDRAULICS
DCE-304

Unit- I

Introduction: Definition of fluid, Fluid Mechanics and hydraulics, hydrostatics, hydrodynamics.

Properties of fluids: Mass density, specific weight , specific gravity, viscosity, real & Ideal fluids surface tension, cohesion, adhesion, and capillarity, vapour pressure and compressibility units of measurements.

Hydrostatic pressure: Pressure intensity, pressure head, Pascals law and its application. Total pressure, resultant pressure and centre of pressure. Total pressure and centre of pressure on vertical and inclined plane surfaces: rectangular, triangular, trapezoidal sections, application of hydrostatic pressure.

Measurement of pressure: Atmospheric pressure, guage pressure, vacuum pressure and absolute pressure, piezometer, simple manometer, differential manometer and Bourden guage.

Unit- II

Fundamentals of fluid flow: Types of flow : steady and unsteady flow, laminar and turbulent flow, uniform and non uniform flow (definition only). Discharge and continuity equation, Types of hydraulic energy: Potential energy, kinetic energy, pressure energy Bernoulliôs theorem, statement and description (without proof of theorem)

Unit- III

Flow measurements: Venturimeter, orifice meter, pitot tube, mouthpiece, notches and weirs, flumes, spillways, current meters.

Hydraulic Machines: Reciprocating pumps: centrifugal pumps, impulse turbine, reaction turbine (sketch and description of principle of working)

Unit- IV

Flow through pipes: Definition, Laminar flow and turbulent flow explained through Reynoldôs experiment. Reynoldôs number, critical velocity and velocity distribution is a pipe for laminar and turbulent flows.

Head loss in pipe lines due to friction, sudden expansion and sudden contraction, entrance, exit, obstruction and change of direction (no derivation of formula). Hydraulic gradient line & total energy line. Flow from one reservoir to another through a large bent pipe of uniform cross section in series and parallel. Water hammer phenomenon and its effects (only definition).

Unit- V

Flow through open channels: Definition of an open channel uniform flow and non uniform flow, comparison of open channel and pipe flow. Discharge through channels using (a) Chezyôs formula (no derivation), (b) Manningôs formula (no derivation). Most economical channel sections, rectangular, trapezoidal and circular section.

Text Books:

1. Fluid Mechanics and hydraulic machines by Dr. R.K. Bansal- Laxmi Publications

Reference Books:

1. Hydraulics and fluid mechanics by Modi P.N, and Seth SM, Delhi standard Publishers distributor.
2. Hydraulics Machines by Khurmi R.S, S. Chand and Co. publication, New delhi

COMPUTER APPLICATION
DCA-305

UNIT–I

Digital Computer systems, Characteristics, History, Computer Generations, Types of computers & their classifications, application of Computer in various fields, Computer Hardware & Software, Elements of computer hardware-CPU, I/O devices, storage media, Computer Software-Types of Software, System Software, Application Software.

UNIT-II

Basic concept & functions of an operating system, textual Vs GUI Interface, type of Operating Systems, concept of multiprogramming, multitasking, multiprocessing, Introduction to disk operating system (DOS), Commands and utilities, working with MS Windows, Unix and Linux, Working knowledge of PC Software Word Processor.

UNIT–III

Computer Languages, Generation of Languages, Translators- Assemblers, Interpreters, Compilers, Algorithm, Pseudo-code, Flowcharts- rules & symbols, Structured Programming concepts, various techniques of programming, Use of programming.

UNIT–IV

Introduction to óCô, importance of C, basic structure of a C program, constants, variables and data types, operators and expressions, managing I/O operators, Control Statement: óIFô statement and its various forms, goto statement, for, while and do-while loops, switch decision making statement, Arrays: Array notation, storage and representation, Functions: user defined functions and their use.

BUILDING CONSTRUCTION PRACTICAL
DCE-311

List of Experiments:

1. To know about the tools used in Masonry work.
2. To determine the silt content in fine aggregate.
3. To determine necessary adjustment for bulking of fine aggregate.
4. To determine the dimension tolerance test of F.P.S. bricks.
5. To find the quantity of water absorbed by brick in terms of percentage of its weight.
6. To construct one brick thick,one and half brick thick and two brick thick joints in English bond.
7. To construct one brick thick, one and half brick thick and two brick thick joints in Flemish bond.
8. To construct a Tee (T) junction between one and one and half brick walls and between one and half brick and two brick walls.
9. To construct a cross junction between one brick walls and between one and $1\frac{1}{2}$ brick wall in English wall.
10. To construct alternate courses of $1\frac{1}{2}$ brick wall in single Flemish bond.
11. To construct brick pillars of different thicknes, one brick thick, $1\frac{1}{2}$brick thick two brick and $2\frac{1}{2}$ brick thick in English and Flemish bond.

SURVEYING-II, PRACTICAL
DCE-313

List of Experiments:

1. To plot the features of the ground by radiation method of plane table surveying.
2. To plot the features of the ground by intersection method of plane table surveying.
3. To do plane table traversing.
4. To solve three point problem by graphical method.
5. To solve three point problem by tracing paper method.
6. To solve two point problem.
7. To prepare a contour plan of a given site by square grid method.
8. To determine the horizontal angle by using a vernier transit theodolite.
9. To determine the horizontal angle by repetition method using a vernier transit theodolite.
10. To determine the horizontal angle by reiteration method using a vernier transit theodolite.
11. To measure the bearing of a line by using a vernier transit theodolite.
12. To measure the vertical angle by using a vernier transit theodolite.
13. To do theodolite traversing and fill in the Galeôs traverse table.

HYDRAULICS PRACTICAL

DCE-314

List of Experiments:

1 To verify the Bernoulliòs theorem and plot the graph

(i) Static head v/s Length of passage

(ii) Velocity head v/s Length of passage

(iii) Total v/s Length of passage

2. To determine coefficient of friction in a pipe line using Darcy formula
3. To determine coefficient of contraction in given pipe line.
4. To determine the coefficient of bend in given pipe line .
5. To determine the coefficient of elbow in given pipe line.
6. To determine the coefficient of discharge of a venturimeter .
7. To determine the coefficient of a orifice meter
8. To determine the coefficient of discharge through V-notch apparatus.
9. To determine the head loss due to sudden enlargement.

COMPUTER APPLICATION PRACTICAL
DCA-315

List of Experiments:

1. Given a PC, name its various components and list their functions.

2. Features of Windows Operating System:

a. Start
b. Shutdown and restore
c. Creating and operating on the icons
d. Opening, closing and sizing the windows
e. Creating, saving, modifying, renaming, finding and deleting a file
f. Creating and operating on a folder
g. Changing setting like-date, time
h. Using shortcuts
i. Windows system Tools
j. Control Panel

3. MS-WORD

a. File Management: Opening, creating and saving a document, files, copying contents in some different file(s).
b. Page Setup: Setting margins, tab setting, ruler, indenting.
c. Editing a Document: Entering text, cut, copy and paste using toolbars.
d. Formatting A Document: Using different fonts, changing font size and color, changing the appearance through bold/italic/underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods.
e. Aligning of text in a document justification of document, inserting bullets and numbering.
f. Use of headers, footers: inserting foot note, endnote, use of comments.
g. Inserting date, time, special symbols, importing graphic images, drawing tools.
h. Tables and border: Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table.
i. Print preview, zoom, page setup, printing options.
j. Using tools like: Spellchecker, help, use of macros, mail-merge, thesaurus word content and statistics, printing envelops and labels.

4. MS-EXCEL

a. Starting excel, open worksheet, enter and edit data, formulas to calculate values, format data, create chart, printing chart, save worksheet.
b. Menu Commands: Create, format charts, organize, manage data, solving problem by analysing data.
c. Editing a worksheet, copying, moving cells, pasting inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet.
d. Creating a Chart: Working with chart types, changing data in chart, formatting a chart, use chart to analyse data.
e. Using a list to organize data, sorting and filtering data in list.

5. MS-POWER POINT

a. Preparing Presentation: Creating a new slide, sorting slides, inserting pictures, setting header and footer.
b. Formatting: Setting fonts, alignments, slide design, slide layout.
c. Slide Show: View show, Rehearse timing, action buttons, slide transition, animation skills.

6. PROGRAMMING IN C

a. Write a program in C on defining variables and assigning values to variables.
b. Write a program in C on formatting input/output using printf and scanf.
c. Write a program in C on arithmetical, relational and logical operators.
d. Write a program in C on if-else statement.
e. Write a program in C on do-while statement/loop.

f. Write a program in C on for statement/loop.
g. Write a program in C on switch statement.
h. Write a program in C on 1 dimensional array.
i. Write a program in C on 2 dimensional arrays.
j. Write a program in C on strings
k. Write a program in C on functions

COMMUNICATION SKILLS-II
DCES-401

UNIT	Topic	Marks
I.	Reading *Comprehension (Advanced)*	10
II.	Grammar *Direct & Indirect*	5
III.	Writing *a. Dialogue* *b. Paragraph*	15
IV.	Speaking - I *Presentation Skills*	15
V.	Speaking - II *Interview*	15

CONCRETE TECHNOLOGY
DCE-402

Unit- I

Introduction: Definition of concrete, brief introduction to properties of concrete, advantages of concrete uses of concrete in comparison to other building materials.

Cement- Physical properties- consistency, initial setting time and final setting time, soundness and fineness. Hydration of cement, heat of hydration, different types of cement.

Unit- II

Aggregates: Classification of aggregates according to shape and size. Fineness modulus of aggregates, grading of aggregates properties of aggregates, strength, Toughness, hardness, durability, bulk density and water absorption.

Unit- III

Proportioning of concrete: Object of proportioning of concrete, preliminary test, works test, controlled concrete and ordinary concrete. Strength required for various types of concrete mixes. Methods of concrete mix design, fineness modulus method, water cement ratio. Importance of water quality, law and the conditions under which the law is valid, internal moisture, temperature and age use of CRRI charts.

Concreting operations: Storing of cement and aggregates, batching Mixing, hand mixing and machine mixing , Transportation of concrete, placement of concrete, compaction, finishing and curing of concrete, Jointing, location of construction joints, expansion joints, Defects in concrete, identification and method of repair.

Unit- IV

Durability of concrete: Factors affecting durability, permeability of concrete, Sulphate attack, thermal properties and fire resistance, expansion and contraction joints, repair of cracks.

Special purpose concrete: Introduction to readymix concrete, high strength concrete, light weight concrete, fiber reinforced concrete. Ferrocement and its uses.

Unit- V

Properties of concrete in plastic stage: Quality control of concrete, workability, tests on workability, factors affecting workability, segregation, bleeding properties of concrete in the hardened state strength, toughness, durability, hardness impermeability and dimensional changes admixtures, accelerators and retarders and their use. Concreting under special conditions, cold weather concreting and hot weather concreting.

Text Books:

1. Concrete Technology by A.M. Neville and J.J. Brooks, Publisher Longman Scientific & Technical

Reference Books:

1. A Text Book of Concrete Technology by P.D. Kulkarno, R.K. Ghosh and Y.R. Phull, Oxford and IBH Publishing, New Delhi
2. Concrete Technology by M.L. Gambhir, Mac Millan India Ltd., New Delhi
3. Concrete Technology theory and practice by M.S. Shetty, S. Chand Publication, New Delhi

THEORY OF STRUCTURES
DCE-403

UNIT 1:

Simple stresses & strains: Types of stresses and strains- tensile, compressive and shear stresses and strains. Concept of elasticity nominal stress, yield stress, plastic stage, strain hardening, ultimate strength and breaking stress, percentage elongation, proof stress, working stress, factor of safety, shear modulus, Poissonôs ratio, lateral strain, relation between E,G&K. Composite sections, temperature stresses in bars of uniform section (composite section to be excluded).

Compound stress: principal stress and maximum shearing stress. Mohrôs circle

UNIT 2:

Bending moment and shearing force: Types of loading- concentrated, U.D.L and varying load. Types of end supports- roller, hinged and fixed supports. Types of beams ï statically determinate and statically indeterminate. Concept of bending moment and shearing force. BMD and SFD for cantilevers and simply supported beams with and without overhangs subjected to concentrated and

U.D.L. Relation between load, shear force and bending moment, point of maximum bending moment and point of inflexion/ contraflexure.

UNIT 3:

Bending Stress: Theory of simple bending, bending equation (no derivation), moment of resistance, bending stress distributions, calculation of maximum bending stress in beams of rectangular, circular, I and T sections, permissible bending stress. Section modular for rectangular, circular and symmetric I section. Comparison between I, rectangular and circular section with regards to their strength.

Shear Stress: Concept of shear stresses in beams, shear stress distribution in rectangular, I and T Section (no derivation)

Combined Direct and Bending Stress: Concentric and eccentric loads, eccentricity, simple cases of short columns of uniform section subjected to eccentric loading with stress diagrams, problems on chimneys, dams and retaining walls.

UNIT 4:

Torsion: Concept of torsion, torsion equation (no derivation), shear stress diagram for solid and hollow shafts, comparison between solid and hollow shafts with regard to their strength and weight. Power transmission by shafts, concept of mean and maximum torque

Columns and struts: Concept of column, modes of failure, types of column, buckling load, crushing load, slenderness ratio, factors effecting strength of a column, and End restraints, effective length. Strength of column by Eulerôs formula, Rankine Gordon formula, IS formula, Perry Robertson formula.

UNIT 5:

Analysis of trusses: Concept of a frame, perfect, redundant and unstable frame, end supports. Analysis of determinate truss by method of joints and method of sections.

Strain energy: due to direct stresses, proof resilience and modulus of resilience, stress due to gradual, sudden and falling loads.

Thin walled tubes: longitudinal and circumferential stresses in seamless thin walled tubes.

Text Books:

1. Theory of structures by R.S. Khurmi, S. Chand publication, New Delhi

Reference Books:

1. Strength of Material, Vol I by B.C. Punmia, Standard Publishers Distributors, New Delhi
2. Analysis of Structures by V.N. Vazirani and M.M. Ratwani, Khanna Publishers, New Delhi
3. Strength of Materials by S. Ramamrutham, Dhanpat Rai & Sons, New Delhi

ENVIRONMENTAL ENGINEERING-I
DCE-404

Unit- I

Introduction: Importance of water supply, need for protected water supply, objectives of water supply system, role of agencies, water supply and sanitation development in India.

Quantity of water: Estimating requirements, design period, per capita consumption, fluctuation in rate of consumption, numerical problems.

Sources of water supply: Major (surface and underground) water sources, quality and quantity of water in surface and underground sources, selection of suitable sources of water supply, necessity & determination of the capacity of storage reservoir by Mass curve method.

Unit- II

Intakes and Conveyance of water: Intakes, types of intakes, location and requirement of an intake, types of conduits, pipe material, various types of pipe joints, laying of pipes, hydrostatic test.

Quality of Water: Impurities in water and their importance, collection of water samples, physical, chemical and bacteriological analysis of water, standards of quality for domestic water supply.

Sedimentation: Sedimentation aided with coagulation, various coagulants, mechanism of coagulation and floc formation, stage in coagulation, design of sedimentation tank.

Unit- III

Filtration: Theory of filtration, types of filters, working and comparison of slow and rapid sand filter, sectional elevation and plan of slow sand filter and rapid sand filter, pressure filter.

Disinfection of water: Necessity of disinfection, requirements of good disinfectant, methods of disinfection, theory of disinfection by chlorine, chlorine demand, different practices of chlorination, sketch of chlorinator, use of bleaching power.

Storage of clear water and its distribution: Layout of water distribution systems along with their advantages and disadvantages, design of distribution system, causes, detection and prevention of wastage of water.

Unit- IV

Sanitation: Terms and definitions, system of sanitation and their merits and demerits, system of waste water and their advantages and disadvantages, choice of wastewater system and suitable system for India, quantity of sanitary and storm sewage.

Flow in sewers: Quantity of sanitary and storm water, variations in flow of sewage and their importance, dry weather flow, types of sewer, condition of flow in sewers, self cleansing and limiting velocities in sewers.

Construction and Maintenance of Sewers: Sewer appurtenances, materials for sewer, laying of sewers, joints and Testing of sewer joints, maintenance, operation and precaution before entering a manhole.

Characterization and Examination of Sewage: Physical, chemical and biological characteristics of sewage, physical, chemical and biological examination of sewage including pH, BOD and allied numerical problems.

Disposal of Sewage: Methods of disposal, the conditions for adopting different methods,

dilution methods, standards of dilution, self purification of natural streams, permissible loads and limits of pollution to be discharged into inland surface water and public sewer, disposal by land treatment method, treatment standards for sewage effluents, effluent irrigation and sewage farming, sewage sickness and itôs preventive measures.

Unit- V

Treatment of Sewage: Definitions of preliminary, primary, secondary and tertiary treatment, types of treatment units employed in sewage treatment, their function and efficiencies comparative statement, grit chambers and detritus tanks, skimming tanks, primary Sedimentation, filtration of sewage, tricking filters, activated sludge process, comparison of trickling filters and ASP, oxidation ponds Aerated lagoons.

Septic and Immhoff Tanks: Theory, working and design criteria of septic and immhoff tanks, advantages and disadvantages of septic and immhoff tanks, Sectional elevation and plan of septic and immhoff tanks.

Air Pollution: causes, effects and controls

Noise Pollution: Causes, effects and controls.

Text books:

1. Water Supply Engineering, Vol I & II by S.K. Garg, Khanna Publishers, New Delhi

Reference Books:

1. Water Supply and Sanitary Engineering by G.S. Birdie, J.S. Birdie, Dhanpat Rai Publisher, New Delhi
2. Water Supply and waste water Engineering by B.S.N. Raju, Tata Mc Graw Hill, New Delhi
3. Government of India Manual on water supply system & treatment

CONSTRUCTION MATERIALS
DCE-405

Unit- I

Building Stones: Classification of rocks (brief review only); Geological classification. Igneous, sedimentary and metamorphic rocks, Chemical classification; calcareous, argillaceous and siliceous rock. Physical classification unstratified, stratified and foliated rocks. General characteristics of stones, requirements of good building stones and their testing. Identification of common building stones, various uses of stones in construction.

Unit- II

Bricks: Introduction, raw materials for brick manufacturing and properties of good brick making earth, manufacturing of bricks, preparation of clay (Manual & mechanically), moulding: hand moulding and machine moulding, hand moulding brick table, drying of bricks, burning of bricks, types of kilns (Bullôs Trench kiln and Hoffmanôs kiln, process of burning , size and weight of standard brick, traditional brick, refractory brick, clay-fly ash bricks, sun dried bricks, classification of bricks as per BIS: 1077, Size of brick-IS specification, commercial sizes, Testing of common building bricks as per BIS: 3495, compressive strength, water absorption, efflorescence, dimensional tolerance test, special bricks, building tiles, types of tiles, wall, ceiling, roofing and flooring tiles, Terrazo, ceramic, PVC, linoleum tiles, their properties and uses, stacking of bricks and tiles at site.

Unit- III

Cement: Introduction, raw materials manufacture of ordinary Portland cement, flow diagram for wet and dry process, properties and uses of ordinary Portland cement, testing of cement as per BIS: Strength of cement, fineness by sieving, consistency, soundness, setting times, Special cements and their uses, storage of cement.

Lime: Introduction, lime as one of the cementing materials, Natural source for the manufacture of lime, definition of terms; quick lime, fat lime, hydraulics, calcinations and slaking of lime , IS classification of lime, testing of lime.

Unit- IV

Timber and wood based products: Identification of different types of timer, Teak, Deodor, shisham, sal, Mango, Kail and Chir, Market forms of converted timber as per BIS. Seasoning of timber, purpose, method of seasoning, kiln seasoning as per BIS. Defects in timber, decay in timber, preservation of timber and methods of treatment as per BIS, Properties of timber and specification of structural timber, common structural timbers in India, their availability and uses ï teak, deoder, Chir, Kail, Shisham, Sal and Mango, plywood, veneers and veneering , manufacturing plywood(brief description only), uses of plywood, other wood based products, their brief description of manufacture and uses, laminated board, black board, fibre board, hard board and gypsum board, applications of board in false ceiling and wall panelling.

Paints and Varnishes: Purpose and use of paints , types of paints, oil paints, water paints and cement paints, **oil paints**; constituents of an oil paint, raw materials used for different constituents of oil paints and their properties, preparation of an oil paint, Characteristics of a good oil paints, Application on wood and metal surfaces.

Cement Paints: Commonly available cement paints, their properties and uses, Application of cement paints, Varnishes and polish types, properties and their uses, lacquers and enamels their properties and uses.

Unit- V

Metals: Ferrous metals; composition, properties and uses of cast iron, steel (mild and high tension steel), requirements of mild steel as per BIS, **non-ferrous;** properties and uses of the following non ferrous metals in Civil Engineering works ï Copper, lead , Zinc, tin and aluminium, Commercial forms of ferrous and non ferrous metals.

Miscellaneous Materials:

Plastics: Important commercial products of plastics used in Civil Engineering construction, Asbestos based products, Commercial forms and their uses, Insulating materials for sound and thermal insulation, Geo-textiles, construction chemicals like water epoxies, sulphides, polymers.

Glass: Types of glasses their properties, Commercial forms and uses , plate glass, wired glass, bullet resisting glass, coloured glass, fibre glass, foamed glass, glass wool, float glass, glass reinforced plastic, Water proofing materials: Bitumen sheets and felts, Chemical admixtures, composite materials.

Text Books:

1. Construction Materials by Subhash Chander and Sanjay Mahajan, Pub. Satya Prakashan
2. Civil Engineering Materials by Parbin singh, Pub. Katson Books.

Reference Books:

1. Building Materials by P.C. Varghese, PHI publication.
2. Construction Material by Amarjeet Aggarwal and N.L. Arora, New India Publishing House, New Delhi

CONCRETE TECHNOLOGY PRACTICAL
DCE-412

List of Experiments:

1 To determine the fineness of cement.
2 To determine the consistency of cement.
3 To determine the initial setting rime of cement.
4 To determine the final setting time of cement.
5 To determine the soundness of cement.
6 To determine the compressive strength of cement cube.
7 To determine the specific gravity of send.
8 To determine the fineness modulus of coarse aggregate.
9 To determine the workability by slump test apparatus.
10 To determine the workability by compaction factor test.
11 To determine the compressive strength of concrete cube.

THEORY OF STRUCTURES PRACTICAL
DCE-413

List of Experiments:

1. To determine the moment of inertia of a Flywheel by using Flywheel Apparatus.
2. To determine the modulus of rigidity of a horizontal shaft by using Horizontal Torsion Apparatus.
3. To determine the modulus of rigidity of the given material by using Vertical Torsion Apparatus.
4. To determine the modulus of rigidity of a given material by using Helical Spring Apparatus.
5. To determine the modulus of elasticity of a given wire by Searleôs Apparatus and plot a graph between stress and strain upto the Elastic Limit.
6. To verify the bending moment at a given cross section of a simple supported beam by using Simple Supported Beam Apparatus.
7. To verify the forces in different members of Jib Crane by Jib Crane Apparatus.
8. To verify the forces in different members of roof truss by using Roof Truss Apparatus.
9. To determine coefficient of friction between rope/ belt and pulley by using Belt/Rope and Pulley Apparatus.
10. To verify the ñTension Ratioò by Belt & Pulley Apparatus.
11. To determine the impact strength of a given specimen by (a) Izod Test & (b) Charpy Test.
12. To test the hardness of the given specimens with a Rockwell Hardness Testing Machine.
13. To determine the Brinell Hardness Number of several materials.

ENVIRONMENTAL ENGINEERING-I, PRACTICAL
DCE- 414

List of experiments:

1. Determination of PH of the given sample of water and waste water.
2. Determination of electrical conductivity of the given sample of water.
3. Determination of alkalinity of the given sample of water.
4. Determination turbidity of a given sample of water.
5. Estimate the chloride (Cl^-) contents in a given sample of water and waste water.
6. Estimation of total dissolve solids (TDS) in a given sample of water.
7. Estimation of optimum dose of coagulant for a given sample of water.
8. Estimation of dissolve oxygen (DO) concentration a given sample of water.
9. Estimation of Bio-Chemical oxygen demand (BOD) for a given sample of water.

CIVIL ENGINEERING DRAWING-I
DCE 416

Unit- I

(a) Detailed drawing of building footing showing section through doors, windows& solid walls.

(b) Double line plan of residential building one bed room set, front elevation and section.

(c) Double line plan of residential building two bed room set with stair hall, front elevation and section through stair hall.

(d) Double line plan of residential building three bed room set with stair hall, front elevation and section through stair hall.

Unit- II

(a) Detailed drawing of brick and stone masonry

English bond : Corner joints of one brick thick wall
: Corner joints of $1\frac{1}{2}$ brick thick wall
: Corner joints of 2 brick thick wall
Flemish Bond : Corner joint of one brick thick wall
: Corner joint of $1\frac{1}{2}$ brick thick wall
: Corner joint of 2 brick thick wall
Stone masonry : Random, Rubble & Ashlar masonry

(b) Front Elevation, sectional plan & sectional side elevation of flush door, panelled door and panelled & glazed door.

(c) Front Elevation, sectional plan, sectional side elevation of panelled window, fully glazed window.

(d) Detail cross- section of flooring as per BIS specification.

Unit- III

(a) Detailed plan and longitudinal section of septic tank with soak pit.

(b) Detailed drawing of modern bathroom & W.C. connection showing position of wash hand basin, tap, shower, towel rail, bath tub etc.

(c) Detailed drawing of king Post wooden roof truss resting on masonry.

(d) Detailed drawing of Queen Post wooden roof truss resting on masonry.

Unit- IV

AutoCad: Concept of Autocad, Tool bars in Autocad coordinate system, snap, grid and ortho mode, Drawing commands- Point, line, arc, circle, ellipse. Editing commands, scale, erase, copy, stretch lengthen and explode, dimensioning and placing, text in drawing area. Sectioning and hatching. Inquiry for different parameters of drawing entity.

Refernce Books:

1. Civil Engineering Drawing by J.S. Layal, Satya Prakashan, New Delhi
2. Civil Engineering Drawing by V.B. Sikka, S. K. Kataria & Sons, New Delhi
3. Introduction to Auto CAD 2011, 2D and 3D design by Alf Yarwood, Auto Desk

SOIL MECHANICS & FOUNDATION ENGINEERING
DCE-501

Unit- I

Introduction: Importance of soil studies in Civil Engg. Geological origin of soil with special reference to soil profiles in India. Residual and transported soils, alluvial deposits, lake deposits, Dunes and Loess, Glacial deposits, conditions in which above deposits are formed and their engineering characteristics.

Saturated and partially saturated soil: Constituents of soil, phase diagram for soil, definition and meaning of void ratio, porosity, degree of saturations, water content, specific gravity of soil grains, unit weights. Typical values of the above with simple inter relationship among them.

Soil Classification and identification : Mineralogical composition, particle size and shape and their effect on engineering properties of soil. Gradation and its influence on engineering properties. Relative density and its use in describing cohesionless soils. Behavior of cohesive soils. Soil with change in water content, Atterberg definitions, use and practical significance. Classification systems basic symbols major divisions, groups, plasticity chart, Unified Soil Classification system, Highway Research Board Classification System and Indian Standard Soil Classification System.

Unit- II

Flow of water through soils: Darcyôs law, co-efficient of permeability and its determination by field and lab methods, discharge velocity and seepage velocity, typical values of coefficient of permeability of different types of soils.

Effective Stress: Stresses in sub soil. Definition and meaning of total stress, effective stress and neutral stress. Principle of effective stress. Importance of effective stress in engineering problems.

Unit- III

Deformation of soils: Meaning conditions /situations of occurrence with emphasis on practical significance of (i) Consolidation (ii) Creep (iii) Plastic flow (iv) Heaving (v) Lateral movement. Definition of compression index, normally consolidated soil, over-consolidated soil. Meaning of total settlement, uniform and differential settlement and rate of settlement and their importance. Effect of settlement on structures, tolerable settlement for different structures. Introduction to vertical stress distribution in the soil due to foundation loads.

Unit- IV

Strength Characteristics of Soil: Example of shear failure in soil. Factors contributing to shear strength of soils. Coulombôs law. Two dimensional stress analysis by Mohrôs stress circle and its application on soils. Methods of determining shear strength (direct shear test, tri-axial compression test, unconfined compression test and vane shear test). Strength and strain curve, peak strength and ultimate strength, their significance. Discrepancies between laboratory and field test.

Soil Compaction: Definition of compaction and its necessity. Laboratory compaction test, definition and importance of optimum water content, maximum dry density, relations for typical soils with different compactive efforts . Field compaction: Methods and equipments,

choice of equipment. Compaction requirement, compaction control, density control. Field density tests; core cutter and sand replacement, Proctorôs needle test.

Unit- V

Bearing Capacity of Foundations: Types of foundations; shallow and deep foundations and their classification. Definition of ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. Terzaghiôs bearing capacity formula and factors affecting bearing capacity. Brief description about factors affecting depth of foundation. Deep foundations; types, classification and load carrying capacity of piles, lateral earth pressure.

Soil Exploration: Purpose and scope of soil explorations. Undertaking planning of sub surface investigation. Influence of soil conditions on exploratory program. Influence of size of project and type of structure on exploratory program. Possibility of mis-adjustment of sub soil conditions. Location depth and spacing of explorations. Methods of soils exploration: Reconnaissance, field identification of soil. Trial pits, Boring (Auger, wash & Rotary). Field tests; PLT, SPT, CPT (static & dynamic). Ground water level measurement. Sampling, undisturbed , disturbed and representative samples, selection of type of sampler, thick, thin wall and piston sampler. Area ratio, recovery ratio of samples and their significance, number and quantity of samples, Labelling, sealing and preservation of samples, presentation of soil investigation results.

Text Books:

1. Soil Mechanics and Foundation Engineering by Dr. K.R Arora, Standard Publication, New Delhi

Reference Books:

1. Soil Mechanics and Foundations by B.C. Punmia, Standard Publishers Distributors, New Delhi
2. Soil Engineering in Theory and Practice by Alam Singh, Asia Publishing House, New Delhi

DESIGN OF R.C.C. STRUCTURES-I
DCE-502

Unit- I

Introduction: Different grades of concrete and steel, I.S specifications, purpose of providing reinforcement, modular ratio, types of loads on structures as per IS:875. Design philosophies--working stress method, ultimate strength method and limit state method.

Singly Reinforced Rectangular Beams by WSM: Assumptions made in working stress method, permissible stresses, stress and strain distribution for rectangular section, actual and critical neutral axis, Under/ Over reinforced and Balanced section, Lever arm, Moment of Resistance. Analysis and design of singly reinforced rectangular beam section by using working stress method (Simple problems).

Unit- II

Introduction to Limit State method: Different Limit States, characteristic and design strength of materials, characteristic loads, partial safety factor for loads and materials.

Singly Reinforced Rectangular Beams: Assumptions for limit states of collapse in flexure, stress strain relation for concrete and steel, maximum strain in concrete. Modes of failure; Under/ Over and Balanced section, mathematical derivation for moment of resistance, maximum and minimum reinforcement, effective span. Analysis and design of singly reinforced rectangular beam section by using limit state method.

Unit- III

Doubly Reinforced Rectangular Beams: Introduction, stress in compression reinforcement, design steps, minimum and maximum reinforcement. Analysis and design of doubly reinforced rectangular beam section by using limit state method.

Unit- IV

Flanged Beam: Introduction, effective width of flange, minimum and maximum reinforcement, types of problem- neutral axis lies in flange or web, analysis and design of flanged beam section by limit state method.

Serviceability Limit States: Serviceability limit state for deflection and cracking (no numerical problems), serviceability requirements.

Curtailment: Requirements for curtailments and detailing of reinforcement.

Unit- V

Design of Shear & Development Length: Limit state of collapse in shear, design shear strength of concrete, design strength of vertical/ inclined stirrups and bent up bars in shear, principle of shear design, critical section for shear, nominal shear stress. Design of stirrups for simply supported, cantilever rectangular and flanged beam. Anchorage and spacing of shear reinforcement. Development length & anchorage bond.

Design of beams: Complete design of a cantilever, simply supported and continuous beams, detailing of reinforcement as per SP:34.

Text Books:

1. Reinforced Concrete by A.K. Jain, Nem Chand & Bros, Roorkee
2. Reinforced Concrete Design by S.N. Sinha, Tata Mc Graw Hill publishing co.

Reference Books:

1. Plain and Reinforce Concrete, Vol I by Jai Krishna and O.P. Jain, Nem Chand & Bros, Roorkee
2. Limit state design by P.C. Varghese, Prentice Hall of India
3. Plain and Reinforced Concrete- Code of Practice, IS: 456- 2000, Manak Bhawan, New Delhi
4. Handbook on Concrete Reinforcement and Detailing, SP 34-1987, March 1989

ANALYSIS OF STRUCTURES
DCE-503

Unit- I

Slope and deflection: Necessity for determination of slope and defection, Moment area theorems (no derivation), deflection equation. Computation of slopes and defections using moment area theorems and double integration method for cantilever and simple supported beam with u.d.l over entire span and concentrated load at any point.

Unit- II

Analysis of statically indeterminate beams: statically indeterminate beams, degrees of freedom, degrees of restraints & degrees of indeterminacy in beams.

Propped Cantilevers: Definition of prop, prop reaction from deflection consideration. SF & BM diagrams by moment area theorem for udl and point loads.

Fixed Beam: Introduction to fixed beam, determination of fixing moments by Moment Area theorem for point load and udl. SF and BM diagrams for supports, at the same level (sinking of supports at different levels not included), slope and deflection at a point by moment area theorem.

Continuous beam: Introduction, Analysis of continuous beams, Clapeyronôs theorem of three moments (no derivation), Application of Clapeyronôs theorem of three moments for continuous beams of two spans with simply supported and fixed ends. SF and BM diagram for the above cases.

Unit- III

Slope Deflection Method : Introduction, sign convention, fundamental equations (no derivation), continuous beams and simple frames without joints translation, BM diagrams for continuous beams and simple frames.

Unit- IV

Moment distribution Method: Introduction, sign convention fundamental prepositions, stiffness factor, carry over factor, distribution factor. Application of moment distribution method to continuous beams up to three spans, simple portal frames with no side sway. BM diagrams for both beams and frames.

Unit- V

Three Hinged Arches: Introduction, linear arch, Eddyôs theorem. Analysis of three hinged Arches, BM and normal thrust for parabolic, circular arch under static loading.

Influence Lines: Introduction, I.L. for shear force, B.M. and reaction. Application of I.L. diagrams for determination of SF and BM due to concentrated and uniformly distributed loads.

Text Books:

1. Theory of structures by R.S. Khurmi, S. Chand publication, New Delhi
2. Strength of Materials by S. Ramamrutham, Dhanpat Rai & Sons, New Delhi

Reference Books:

1. Strength of Materials, Vol I& II by B.C. Punmia, Standard Publishers Distributors, New Delhi
2. Analysis of Structures by V.N. Vazirani and M.M. Ratwani, Khanna Publishers, New Delhi

SURVEYING –III
DCE-504

Unit- I

Trignometrical levelling : Finding elevation of objects: base accessible, base inaccessible, single plane and double plane method: Simple problem. Study of modern/advanced surveying instruments, Micro optic theodolite, electronics distance measuring instruments (EDM), total station, introduction to GIS.

Unit- II

Tacheometric Surveying: Tacheometry instruments to be used in tacheometry, methods of tacheometry. Finding stadia constants. Determination of horizontal and vertical distances with horizontal and inclined sights with staff vertical, use of stadia measurement for traversing and contouring, use of tacheometric tables.

Unit- III

Curves: Simple circular curves, Need and definition of a simple circular cuve. Elements of simple circular curve, degree of the curve, radius of the curve. Tangent length. Point of intersection (Apex point). Tangent point, length of long chord. Deflection angle. Apex distance and Mid-ordinate, setting out simple circular curve (a) by linear measurement only, offsets from the tangent. Successive bisection of arc, offsets from the chord produced (b) by tangential angles using a theodolite.

Unit- IV

Transition Curve: Concept of centrifugal force and super elevation, need and definition of transition curve. Requirement of transition curve, calculations of offsets for transition curve, cubic parabola. Vertical curve; setting out of vertical curve.

Unit- V

Triangulation: Principle, uses, layout, figures of triangulation. Type and system of triangulation, strength of figure. Base line measurement, setting out of works. (setting out building, culvert and centerline of bridge), grade contour, checking verticality of tall building, setting the tunnels alignment.

Text Books:

1. Surveying and Levelling Vol. II&III by B.C. Punmia, Laxmi Publication
2. Surveying, Vol. I & II by K.R.Arora, Standard Book House Publication

Reference Books:

1. Surveying and Levelling Vol. II&III by Duggal
2. Surveying and Levelling Vol. II by Sanjay Mahajan, Satya Prakashan Publication

CONSTRUCTION MANAGEMENT AND ACCOUNTS
DCE-505

Unit- I

Basic Principle of Managements: Management principles, planning, organizing, directing, controlling, organization, structure of organization, structure of construction organization both government and project organizations.

Accident, Safety and Housekeeping: Types, causes, cost and investigation of accidents, hazards, safety analysis, planning, implementation and education. BIS measures for safety (specially in construction industry),fire fighting, First aid, security, pilferage, job layout-location of store, equipments, materials, project office, security guards etc.

Industrial laws: Labour laws, factories act 1948, workmenôs compensation act1923, Minimum wages act 1948, ESI act 1948, EPF act 1952, Industrial Dispute act 1947, payment of wages act 1936, Union.

Unit- II

Personnel Management: Man power planning, sources, recruitment and selection process, testing, interviewing, training and development strategies for workers, supervisors and managers, career planning, industrial relations, discipline, industrial fatigue, leader ship, attitudes and human behaviour, motivation, duties towards workers peers and seniors, wage payment.

Finance Management: Types of economic systems, ownership, Money banking, international trade, foreign exchange, taxes , finance forecasting, capital, sources of finance (loans from government and private), shares, debentures, mutual fund, types of accounts and account statements, final accounts and balance statements, demand and supply theories.

Unit- III

Project Management: Project planning, man, machine, money and material, work breakdown, scheduling, Bar charts, CPM and PERT, types of construction machines-crawler and wheel tractors, Power shovels, cranes, lifts, hoes, trenching machines, selection of equipment etc. Operation, cost, troubles and maintenance, store and inventory management, cash flow, depreciation, installments, interest, manpower planning, organization chart, purchasing, introduction to management software like primavera.

Unit- IV

Quality Control: Specification, inspection, stages of inspection, testing, tolerances, BIS code specifications, for cement, aggregates, steel, concrete & mild steel, Quality Management Systems-ISO: 9000series, Environmental Quality Management system-ISO: 14001 series, Total quality management.

Marketing in Civil Engineering: Importance of marking, marketing of housing, building materials, infrastructures, toll bridges, water supply and sanitation services, consultancy, pricing, construction equipments, shuttering and centering etc, market survey, marketing mix of product and services, tenders and contracts, quotations, branding and packaging invoicing, property dealing, credit facilities and after sales maintenance etc.

Unit- V

Entrepreneurship: Concept and need of Entrepreneurship, entrepreneurial qualities, small scale industries, procedure for setting up an industry construction firm, project report preparation and approval procedure from the concerned agencies.

Professional Ethics: Ethics, morality, social and spiritual values and need, professional bodies, code of conduct, dilemma before a civil engineer, conflict management.

Reference Books:

1. Construction Project Management Theory and Practice by Kumar Neeraj Jha, Published by Dorling Kindersley Pvt. Ltd, India
2. Construction Management and PWD Accounts by D. Lal, S.K. Kataria and Sons publication
3. Managing people by VSP Rao, published by Excel Books, Naraina
4. Project Planning and Control with PERT and CPM by Dr. B.C. Punmia and K.K. Khandelwal, Laxmi publications Pvt. Ltd.
5. Entrepreneurial Development by S.S. Khanka, S. Chand & Co. Pvt. Ltd, India
6. Construction Management and Accounts by J.L. Sharma, Satya Prakashan, New Delhi
7. Entrepreneurship Development by CB Gupta and P. Srinivasan, Sultan Chand and Sons, New Delhi
8. Environmental Engineering and Management by Suresh K. Dhamija, S.K Kataria and Sons, New Delhi

SOIL MECHANICS PRACTICAL

DCE-511

List of Experiments:

1. To collect soil sample by Auger boring and determine its water content.
2. To determine Grain Size Distribution of a given soil sample by Sieve Analysis.
3. To determine the Liquid Limit of a given soil sample by Casagrande Liquid Limit apparatus.
4. To determine the Plastic Limit of a given soil sample.
5. To determine the Shrinkage Limit of a given soil sample.
6. To determine the maximum dry density and OMC of a given soil sample by Standard Proctor Test.
7. To determine the field density by Core Cutter Method.
8. To determine the field density by Sand Replacement Method.
9. To determine the Shear Strength parameters (c & ϕ) of given soil sample by Direct Shear Test.
10. To determine the permeability of soil by Falling Head method.

SURVEYING-III, PRACTICAL
DCE-514

List of Experiments:

1. To find tacheometric constants of a tacheometer using the field observations.
2. To determine the horizontal distance between tacheometric stations using a tacheometer.
3. To determine the horizontal distance between the instrument station and the staff station by using tangential system of tachometry when:-
   (i) both the angles are angle of elevation.
   (ii) both the angles are angle of depression.
4. To do traversing with a tacheometer by method of included angles.
5. To determine the elevation of the top of a building when its base is inaccessible and instrument station and top of building are in the same vertical plane.
6. To determine the elevation of the top of a building when its base is inaccessible and instrument station and top of building are not in the same vertical plane.
7. To determine the elevation of the top of a building when its base is inaccessible and instrument axes are at very different levels.
8. To determine the horizontal and vertical angle by using a Total Station.
9. To determine the area of a given site by using a Total Station.
10. To determine the horizontal angle by method of repetition method using a Total Station.
11. To collect the data of a given site by using a Total Station.
12. To determine the distance between two stations by Missing Line Method (MLM) and the height of a building by Remote Elevation Method (REM) using a Total Station when :
   (a) base is accessible.
   (b) base is not accessible.
13. To layout a simple circular curve by taking offset from the long chord.

CAD IN CIVIL ENGINEERING PRACTICE
DCE-515

Unit- I

Introduction to Auto Cad, definition of various commands used. Simple exercises using Auto Cad commands.

Unit- II

Double line plan, Front elevation and section of a one bed room set residential single storey building.

Unit- III

(a) Detailed drawing of a square column with square isolated footing.
(b) Detailed drawing of a simply supported doubly reinforced beam.

Unit- IV

(a) Detailed drawing of a reinforced Dog legged stair case in a single storey building.
(b) Detailed drawing of column base connections (slab base and gusseted base).

Reference Books:

1. Civil Engineering Drawing by J.S. Layal, Satya Prakashan, New Delhi
2. Civil Engineering Drawing by V.B. Sikka, S. K. Kataria & Sons, New Delhi
3. Introduction to Auto CAD 2011, 2D and 3D design by Alf Yarwood, Auto Desk

CIVIL ENGINEERING DRAWING –II
DCE-516

Unit- I

(a) Details of reinforcement of a R.C.C. square and circular column with isolated square footing.
(b) Details of reinforcement in a simply supported doubly reinforced beam.
(c) Details of reinforcement for a overhang beam.

Unit- II

(a) Details of reinforcement in Plan and section for a simply supported R.C.C one way slab and two way slab.
(b) Details of reinforcement in a two storied R.C.C internal and corner column, and junction of a secondary beam with main beam.
(c) Details of reinforcement for a Dog legged staircase in a single storey building providing access to the roof.

Unit- III

(a) Drawing of reinforcement for a cantilever retaining wall with the given data regarding the reinforcement, size and shape of the wall and its elevation showing the details of reinforcement.
(b) Beam to beam connection (seated and framed)
(c) Beam to column connection (seated and framed)

Unit- IV

(a) Column to column connections (Details of column splices)
(b) Column base connections (slab base and Gusseted base)
(c) Details of joints of a steel roof truss (eaves and ridge)

Reference Books:

1. Civil Engineering Drawing by J.S. Layal, Satya Prakashan, New Delhi
2. Civil Engineering Drawing by V.B. Sikka, S. K. Kataria & Sons, New Delhi
3. Handbook on Concrete Reinforcement and Detailing, SP 34-1987, Amendment in March 1989

TRANSPORTATION ENGINEERING
DCE-601

Unit- I

Highways: Importance of highway transportation, IRC classification of roads, Indian Road congress.

Road Geometrics: Right of way, formation width, road margin, road shoulders, carriage way, side slopes, kerbs, formation levels, camber and gradients, sight distance. Different types of horizontal and vertical curves, super elevation, methods of providing super elevation. Traffic engineering, traffic study, origin and destination study, variation of traffic, speed flow density and their interrelationship, traffic signs, traffic markings, traffic islands and traffic signals, road safety.

Unit- II

Highway Materials: Soil aggregates and bituminous materials, properties and tests California Bearing Ratio Test.

Earth and Gravel Roads: Construction details water bound macadam(WBM), Wet Mix Macadam(WMM) roads, construction details, bituminous roads, Types of bituminous roads surface dressing, semi grouting- full grouting bituminous concrete.

Design of Flexible and Rigid pavements- Flexible pavement, Concrete pavement, types of construction of concrete roads, construction joints.

Hill Roads: Factors considered in alignment, drainage of hill roads

Unit- III

Railways: Classification of Indian railways, different types of gauges

Railway track & Sleepers: Parts of the permanent way-ballast, types of ballast materials sleepers- types of sleepers- concrete, wooden and iron sleepers, different types of rails, track fixtures and fastenings. Maintenance of track, coning of wheels, wear of rails, creep of rails, track drainage.

Unit- IV

Points and Crossings: Purpose and definition of points and crossings, Turnouts ï points and switches, types of crossings, Types of stations and yards station, facilities and equipments, yards; different types of yards.

Signals: Signalling object, classification of signals according to function and location, special signals. Interlocking, principle of interlocking, methods of interlocking, Track laying; Methods of Track laying.

Unit- V

Bridges: Introduction- components of a bridge Factors governing the ideal site selection, bridge foundations, classification of foundations shallow foundations, deep foundation, pile foundation. Well foundations, types of piers, abutments and wing walls, types of super structure steel girders, types of girders, plate girder, box girder. Bridge bearings, types of bridge bearing, different types of bridges, maintenance of bridges.

Text Books:

1. Highway Engineering by S.K. Khanna and C.E.G. Justo, Nem Chand and Bros, Roorkee

Reference Books:

1. Highway Engineering by N.K. Vaswani, Roorkee Publishing House, Roorkee
2. Railway Engineering by Aggarwal
3. Essentials of Bridge Engineering by D. Johnson Victor, Oxford & IBH Publishing Co.

DESIGN OF STEEL STRUCTURES
DCE-602

Unit- I

Introduction: Introduction of steel structures, different types of steel and steel structures. Stress strain diagram and ductility of mild steel. Properties of structural steel as per IS code-physical and mechanical properties, various types of rolled steel sections. Advantages and disadvantages of steel structures. Different types of loads and load combinations. Design philosophy; limit state method of design as per IS Code: 800-2007

Structural steel connections: Riveted, Bolted and welded connections. Design of bolted and welded connections for axially loaded members.

Unit- II

Tension Members: Design of Tension members as per IS code: 800-2007

Design strength of tension member due to yielding of gross section, Rupture strength of critical section and block shear. Design of tension member, flats and angles (Single or double sections)

Unit- III

Compression Members: Design of compression members as per IS code:800-2007

Concept of buckling, slenderness ratio, shape of compression members, buckling class, design compressive stresses and strengths. Design of strut and axially loaded column. Sketch of built up section with lacing or battens (no design). Design of slab base and gusseted base, sketch of column splices.

Unit- IV

Beams: Design of beam as per IS code: 800-2007, plastic moment carrying capacity of a section. Bending and shear strength of laterally supported beam. Deflection limits, web bucking and web crippling. Design of simple supported steel beam (laterally restrained beam only).

Plate Girders: Sketch of plate girder and its elements. Structural behaviour, deflected shapes and functions of various elements of a plate girder, sketches of different types of beam to beam and beam to column connections.

Unit- V

Steel Roof Truss: Types of roof trusses. Calculation of dead, live and wind loads. Design of purlin, design of members of a roof truss, design of joints, Erection of industrial steel sheds (preparation and inspection of column bases, erections of column, longitudinal bracing, field connections, erection of trusses).

Text Books:

1. Limit State Design of Steel Structures by Duggal, Tata Mc Graw Hill Publication, 2010

Reference Books:

1. Design of Steel Structures by Limit State Method by Sia Ram, Pearson Publication
2. Limit State Design of Steel Structures by Siaker, PHI Publication
3. Steel structures Design and Practice by N. Subramanian, Oxford University Press Publication
4. IS Code 800-2007, General construction in Steel Code of Practice
5. Steel table by R. Agor, Birla Publication Pvt. Ltd.

ESTIMATING & COSTING
DCE-603

Unit- I

Introduction: Introduction to quantity surveying and its importance. Duties of quantity surveyor. Types of estimates; preliminary estimates, plinth area estimate, cubic rate estimate, estimate per unit base. Detailed estimates; definition, stages of preparation ï details of measurement and calculation of quantities and abstract.

Unit- II

Measurement, units of measurement for various items of work as per BIS:1200, rules for measurements, Earth work, Brick work (modular and traditional bricks), RCC works, shuttering, wood work, painting, flooring, plastering etc., different methods of taking out quantities- centre line method and long wall and short wall method.

Unit- III

Preparation of Detailed and Abstract Estimates from Drawings; A small residential building with a flat roof, pitched roof with steel truss, timber structures.

Unit- IV

Earthwork for unlined channel, mid section formula, trapezoidal formula, Simpsonôs formula rule, water supply lines, sanitary and water supply fittings, septic tank for a domestic building and cost estimate of septic tanks, WBM road and pre-mix carpeting, tube well, isolated and combined footing, steel truss, piles and piles cap. Single span RCC slab culvert, earthwork for plain, hill roads, RCC work in beams, slab, column and lintel. Arches and their bar bending schedule.

Unit- V

Calculation of quantities of materials for cement mortars of different proportion, Portland cement concrete of different proportion, brick masonry in cement mortar, plastering and pointing, white washing, cement concrete flooring, terrazo flooring, stone masonry ï random rubble and ashlar.

Analysis of Rates: Steps involved in the analysis of rates. Requirement of material, labour, sundaries, contractorôs profit and overheads. Analysis of rates for finished items when data regarding labour, rates of material and labour is given. Earthwork in excavation hard / ordinary soil and filling with a concept of lead and lift, cement concrete in foundation, RCC in roof slab, brick masonry in cement mortar, cement plaster, white washing.

Valuation: Value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation & obsolescence, methods of valuation.

Text Books:

1. Estimating and Costing by B.N. Dutta

Reference Books:

1. Estimating Costing and Valuation by H.D. Pasrija, C.L. Arora and S. Indejit Singh, New Asian Publisher, New Delhi
2. Estimating and Costing by B.S. Rangwala, Charotar Book Stall

DESIGN OF R.C.C. STRUCTURES-II
DCE-604

Unit- I

Design of One Way Slabs: Classification of slabs, effective span, thickness of slab by deflection criteria, main/ secondary reinforcement, minimum reinforcement. Complete design of cantilever, simply supported slabs and sun shades by limit state method, detailing of reinforcement as per SP:34, curtailment of bars.

Design of Two Way Slabs: Introduction, middle and edge strips, B.M coefficients, simply supported and restrained slabs, provision for torsion reinforcement. Complete design of two way slabs by using B.M. coefficients with different boundary condition, detailing of reinforcement as per SP:34, curtailment of bars.

Unit- II

Design of staircases: Introduction to staircases, types of stairs according to geometry and structural behavior, effective span of stairs, effective breadth of flights. Design of dog-legged staircase, detailing of reinforcement as per SP:34.

Design of Columns: Limit states of collapse in compression, assumptions, effective length of compression members, slenderness limits for columns, classification of columns, minimum eccentricity for column loads, longitudinal and transverse reinforcement. Design of axially loaded short columns with lateral ties/ helical reinforcement, detailing of reinforcement as per SP:34

Unit- III

Design of Column footings: Bearing capacity of soil, depth of foundation, types of footings, isolated and combined footings, minimum thickness, critical sections, minimum reinforcement, development length, anchorage, cover, minimum edge thickness. Design of isolated footing (square and rectangular) with uniform/ varying thickness, detailing of reinforcement as per SP:34.

Unit- IV

Water Tanks: Introduction, members subjected to axial tension, bending moment, combined direct and bending moment, permissible stresses in concrete, steel, minimum reinforcement, design of circular and rectangular tanks resting on ground, elevated or overhead water tanks.
Retaining walls: Introduction, types of retaining walls, forces on retaining walls, stability requirements, proportioning and design of cantilever retaining wall.

Unit- V

Multistorey Buildings: Structural systems, Loads- dead load, live load, wind load and earthquake load, reduction in live load, load combinations. Analysis for lateral loads. Design of a simple multistorey framed building for load combinations by using manual calculation and with the help of structural software like STAAD PRO.

Text Books:

1. Reinforced Concrete by A.K. Jain, Nem Chand & Bros, Roorkee
2. Reinforced Concrete Design by S.N. Sinha, Tata Mc Graw Hill publishing co.

Reference Books:

1. Plain and Reinforce Concrete, Vol I by Jai Krishna and O.P. Jain, Nem Chand & Bros, Roorkee
2. Limit state design by P.C. Varghese, Prentice Hall of India
3. Plain and Reinforced Concrete- Code of Practice, IS: 456- 2000, Manak Bhawan, New Delhi
4. Handbook on Concrete Reinforcement and Detailing, SP 34-1987, Amendment in March 1989

ENVIRONMENTAL ENGINEERING -II
DCE-605

Unit I
Introduction: Effects of industrial wastes on streams, land, air and waste water treatment plants, water quality criteria, effluent standards: Process Modification, Methods and Materials changes, house keeping etc., to reduce waste discharges, and strength of the waste and established recovery and reuse methods for by products within the plant operations .
Agro Industries: Fertilizer

Unit II
Chemical Industries: Petro chemicals and refineries, Pharmaceuticals.
Apparel Industries: Textiles, synthetic Fibers, leather, paper.

Unit III
Food Industries: Meat packing, pickles, canning, poultry, Distilleries, Sugar, Dairy.
Metallurgical Industries: Steel plants, Mines, Non-Ferrous metal industries collieries.

Unit IV
Power Industries : Thermal power station, Nuclear Power plants.
Radio Active Industry: Conventional methods of treatment and disposal of industrial wastes . Equalisation and Neutralisation, sedimentation and filtration.

Unit V
Removal of Organic Contents: Biological Treatment method, aerobic digestion and an-aero digestion- Tricking filters, stabilization ponds, activated sludge process- oxidation ditch.
Removal of Inorganic Dissolved Solids: Evaporation, Dialysis, Ion exchange, Miscellaneous methods.

Reference Books:

1. Theories and Practices of Industrial Waste Treatment by N.L. Nemerow
2. Principles of Industrial waste Tretment by C.F. Gurnham
3. Treatment and Disposal of Industrial Waters by Southgate

TRANSPORTATION ENGINEERING PRACTICAL
DCE -611

List of Experiments:

1. Aggregate impact Test.
2. Dorryôs Abrasion Test.
3. Loss Angles Abrasion Test.
4. Califonia Bearing Ratio Test
5. Aggregate Crushing Test
6. Bitumen Softening Point Test.
7. Bitumen Hardness Test.
8. Bitumen Viscosity Test.

ENVIRONMENTAL ENGINEERING-II PRACTICAL
DCE -615

List of Experiments:

1. Determination PH of the given sample of Industrial waste water.
2. Determination of Electrical Conductivity of the given sample of waste water.
3. Determination of Alkalinity of the given sample in Industrial waste water.
4. Determination of Turbidity of a given sample of Industrial waste water.
5. Estimate of the Chloride content in a given sample of waste water.
6. Estimation of total dissolve solids (TDS) in a given sample of waste water.
7. Estimation of total suspended solids (TSS) in a given sample of waste water.
8. Estimation of Optimum dose of coagulant for a given sample of waste water.
9. Estimation of Dissolve Oxygen (DO) concentration in a given sample of Industrial waste water.
10. Estimation of Bio-Chemical Oxygen demand (BOD) for a given sample of Industrial waste water.

PROJECT
DCE-620

As far as possible the students should be given live project problems with a view to develop first hand experience and confidence amongst the students to enable them to use and apply engineering based knowledge and skills to solve practical problems. The chosen activities should be as per curricular interest to students and of professional value to industrial field organizations. Each teacher is expected to supervise 8-10students.

Efforts should be made to identify actual field problems to be given as project work to the students. Students may be assessed both by industry and polytechnic faculty. The suggested performance criteria is given below:

(a) punctuality and regularity
(b) Initiative in learning
(c) Sense of responsibility
(d) Communication skills
(e) Interpersonal skills
(f) Report writing skills
(g) Viva voce

Some of suggested projects are given below:

(1) Water supply system for one or two villages: This may include Surveying, Design of water requirements and water distribution system, Preparation of drawing of overhead tank, Material estimating and costing, Specifications, Technical report writing.

(2) Design of shopping complex, detailing of RCC drawing, estimating and costing of materials.

(3) Rainwater harvesting: This may include assessment of catchment area, Intensity of rain fall, Collection of water, Soak pit design, Supplying of water, Monitoring during raining season

(4) Design of septic tank with soak pits

(5) Preparing plumbing detailed drawings of a two storey building and material estimate & costing

(6) Planning and design of sports stadium

(7) Design of small residential building including design of structural members, specifications, estimating and costing of materials, report writing and municipal drawings for water supply and sewerage system.

(8) Quality control of materials, concrete and construction activities.

(9) Valuation of buildings

(10) Pollution prevention and control studies

(11) Concrete Mix Design

(12) Manufacturing of Cement

(13) Design of foundations

(14) Testing of Beams

(15) Manufacturing of Rapidwall / Gypcrete

(16) Analysis and Design of single or double storey Rapidwall building

(17) Design of Expressway/ National highway

(18) A study of defects in buildings
(19) Potability of ground and municipal water
(20) Analysis & design of workshop / Industrial structures
(21) Design of sewerage systems
(22) Soil Stabilization technique
(23) Design of flexible pavement
(24) Preparations of bill of quantities (BOQ) and Tender.
(25) Preparation of Soil Reports
(26) Sizing of tanks used in effluent treatment plant
(27) Sizing of tanks used in sewage treatment plant
(28) Water distribution system in a colony
(29) Design of long span roof / bridge truss
(30) Design of T-Girder bridge
(31) Design of roof trusses in industrial buildings
(32) Design of steel foot over bridges
(33) Design of plate girder bridges
(34) Analysis and Design of ground/underground/overground reinforced concrete water tank
(35) Analysis and Design of reinforced concrete retaining wall