

J. S. University , Shikohabad



Diploma

THREE YEAR DIPLOMA COURSE IN
Civil Engineering

Scheme & Syllabus

[Effective from the session 2015-16]

**STUDY AND EVALUATION SCHEME FOR
THREE YEAR DIPLOMA COURSE IN
CIVIL ENGG.**

SEMESTER - FIRST

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DAS-11	Professional Communication	4	1	-	-	20	50	70	2.5
2	DAS-12	Applied Mathematics-I	4	1	-	-	20	50	70	2.5
3	DAS-13	Applied Physics-I	4	1	-	-	20	50	70	2.5
4	DAS-14	Applied Chemistry	4	1	-	-	20	50	70	2.5
5	DDW-11	Engineering Drawing	-	-	-	12	20	50	70	3

PRACTICA/DRAWING SUBJECTS

6	DAS-11P	Professional Communication	-	-	4		20	40	60	3
7	DAS-14P	Applied Chemistry	-	-	4		20	40	60	3
8	DGD-10	Games//Social and Cultural Activities + Discipline (15 + 10)							25	
Grand Total									495	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

**STUDY AND EVALUATION SCHEME FOR
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SEMESTER - Second

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DAS-22	Applied Mathematics-II	4	1	-	-	20	50	70	2.5
2	DAS-23	Applied Physics-II	4	1	-	-	20	50	70	2.5
3	DME-21	Applied Mechanics	4	1	-	-	20	50	70	2.5
4	DCE-21	Building Material	4	1	-	-	20	50	70	2.5
PRACTICA/DRAWING SUBJECTS										
5	DAS-23P	Applied Physics-II Lab	-	-	4	-	20	40	60	3
6	DME-21P	Applied Mechanics Lab	-	-	4	-	30	60	90	3
7	DWP-21P	Workshop Practice	-	-	4	-	30	60	90	3
8	DCS-21P	Computer Application For Engineering	-	-	4	-	30	60	90	3
9	DCE-21P	Building Material Lab					20	50	70	3
10	DGD-20	Games//Social and Cultural Activities + Discipline (15 + 10)							25	
Grand Total									705	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

**STUDY AND EVALUATION SCHEME FOR
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SEMESTER - THIRD

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DEM-31	Ele.Elect.& Mech. Engg.	4	1	-	-	20	50	70	2.5
2	DME-34	Strength of Material	4	1	-	-	20	50	70	2.5
3	DCE-31	Hydraulics	4	1	-	-	20	50	70	2.5
4	DCE-32	Public Health Engg.	4	1	-	-	20	50	70	2.5
5	DCE-33	Surveying-I	4	1	-	-	20	50	70	2.5

PRACTICA/DRAWING SUBJECTS

6	DME-34P	Strength of Material Lab	-	-	4	-	30	40	70	3
7	DCE-31 P	Hydraulics Lab	-	-	4	-	30	40	70	3
8	DCE-32 P	Public Health Engg. Lab	-	-	4	-	30	40	70	3
9	DCE-33 P	Surveying-I Lab	-	-	4	-	30	40	70	3
10	DGD-30	Games//Social and Cultural Activities + Discipline (15 + 10)							25	
Grand Total									655	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

**STUDY AND EVALUATION SCHEME FOR
THREE YEAR DIPLOMA COURSE IN
CIVIL ENGG.**

SEMESTER - FOURTH

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DCE-41	Soil Mechanics &found.Engg	4	1	-	-	20	50	70	2.5
2	DCE-42	Building const. &Maint.Engg.	4	1	-	-	20	50	70	2.5
3	DCE-43	Concrete Technology	4	1	-	-	20	50	70	2.5
4	DCE-44	Civil Engineering Drg. I	-	-	-	10	20	50	70	3
PRACTICA/DRAWING SUBJECTS										
5	DCE-41P	Soil Mechanics &found.Engg Lab	-	-	4	-	30	40	70	3
6	DCE-42P	Building const. &Concrete TechnologyLab	-	-	4	-	30	40	70	3
7	DGD-40	Games/Social and Cultural Activities + Discipline (15 + 10)							25	
Grand Total									445	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

**STUDY AND EVALUATION SCHEME FOR
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SEMESTER - Fifth

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DCE-51	Design of reinforced concrete structure	4	1	-	-	20	50	70	2.5
2	DCE-52	Transportation Engg.	4	1	-	-	20	50	70	2.5
3	DCE-53	Estimating ,costing and valu.	4	1	-	-	20	50	70	2.5
4	DCE-54	Surveying-II	4	1	-	-	20	50	70	2.5
5	DCE-55	Irrigation engg.	-	-	-	8	20	50	70	2.5
PRACTICA/DRAWING SUBJECTS										
6	DCE-54P	Surveying-II	-	-	4	-	30	100	130	3
7	DFE-51P	Field Exposure	-	-		-	20	50	70	3
9	DGD-50	Games//Social and Cultural Activities + Discipline (15 + 10)							25	
Grand Total									575	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilized for revision etc.

**STUDY AND EVALUATION SCHEME FOR
THREE YEAR DIPLOMA COURSE IN
Civil ENGG.**

SEMESTER - Sixth

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DCE-61	Environmental Pollution and Control	4	1	-	-	20	50	70	2.5
2	DCE-62	Design of Steel and Masonary Structure	4	1	-	-	20	50	70	2.5
3	DCE-63	Construction Entrepreneurship Development	4	1	-	-	20	50	70	3
4	DCE-64	Civil Engg. Drawing	4	1	-	-	20	50	70	2.5
5	DCE-65	Earth Quake	4	1	-	-	20	50	70	2.5

PRACTICA/DRAWING SUBJECTS

6	DCE-61P	Project Work	-	-		-	50	100	150	3
7	DCE-62P	Civil Lab-III			10		40	60	100	3
9	DGD-60	Games//Social and Cultural Activities + Discipline (15 + 10)							25	
Grand Total									625	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

DAS-11 Professional Communication

1. PART I : COMMUNICATION IN ENGLISH

1.1 Concept of communication, importance of effective communication, types of communication, formal, informal, verbal and nonverbal, spoken and written. Techniques of communication, Listening, reading, writing and speaking, Barriers in communication, Modern tools of communication-Fax, e-mail, Telephone, telegram, etc.

1.2 Technical communication Vs. General Communication :Development of comprehension and knowledge of English through the study of text material and language exercises based on the prescribed text book of English.

1.3 Development of expression through:

1.3.1 Paragraph writing, Essay writing, Proposal writing.

1.3.2 Business and personal correspondence (Letters) :Kinds of letters:-Official, semi-official, unofficial , for reply or inreply, quotation, tender and order giving letters.Application for a job, Resume.

1.3.3 Report writing and Note making and minutes writing.

1.4 Functional Grammar : Study of sentences and parts of speech(word class), Preposition, Verb, Articles, Abbreviations.

1.5 Vocabulary Building : Homophones, One word substitution,Idioms and Phrases.

1.6 Composition on narrative, descriptive, imaginative,argumentative, discussion and factual topics.

2. PART II : COMMUNICATION IN HINDI

2.1 Development of comprehension and knowledge of Hindi usage through rapid reading and language exercises based on prescribed text material developed by IRDT.

2.2 Development of expression through ;Letter writing in Hindi:Kinds of letters:-Official, semi-official, unofficial , for reply or inreply, quotation, tender and order giving letters.Application for a job, Press release in Hindi, Report writing.

Note: Paper should be in two parts, part I - English and part II -Hindi.

REFERENCE BOOKS

1. Bookshelf worksheet of Professional Communication, New Delhi: Bookshelf 2008

2. Functional Skills in language and literature by R. P. Singh,New Delhi : Oxford University Press.

3. Oxford English Hindi English Dictionary, New Delhi : Oxford 2008

DAS-11P Professional Communication Lab

For the practice/exercise the following is suggested :-

1.A. Phonetic transcription

B. Stress and intonation :

(At least 10 word for writing and 10 word for pronunciation)

2. ASSIGNMENT : (Written Communication)

Two assignment of approximately 400 word each decided by the teacher concerned.

THE FOLLOWING MODEL IS PROPOSED :

1. a picture/photograph

2. an opening sentence or phrase

3. a newspaper/magazine clipping or report

4. factual writing which should be informative or argumentative.

(The students may refer to "Bookshelf worksheet" for technical communication)

3. Oral Conversation:

1. Short speeches/declamation : Bid farewell, Felicitate somebody, Celebrate a public event, Offer condolences

2. Debate on current problems/topics

3. Mock Interview : Preparation, Unfolding of personality and Expressing ideas effectively

4. Group discussion on current topics/problems

5. Role Play/ general conversation : Making polite enquiries at Railway Station, Post Office, Banks and other Public places, Replying to such enquiries, enquiring about various goods sold in the market and discussing their prices.

Complaining about service at Hotel, restaurant, Offering apologies in reply to such complaints, complain to a company about a defective product you have brought, reply to such complaints.

6. Presentation skill, Use of OHP and LCD.

7. Through drilling of model words involving different phonetic symbols (Vowels, Consonants, Diphthongs).

4. Aural : Listening to conversation/talk/reading of short passage and then writing down the relevant or main points in the specified number of words and answering the given questions. The assignments/project work are to be evaluated by the internal/ external examiner. The distribution of 30 marks e.g.

10 marks for assignment (Given by subject teacher assessmental marks)

10 marks for conversation and viva-voce

10 marks for phonetic transcription

DAS-12 APPLIED MATHEMATICS - I

Unit -1: Algebra-I

1. Arithmetic Mean: nth term, sum ,Mean
2. Geometric Mean: nth term, sum ,Mean
3. Binomial Theorem for positive, negative and fractional index (without proof)
4. Determinants: Elementary properties of determinants of order 2 and 3, system of linear equations and solution , Cramer`s Rule

. Unit -2: Algebra-II

1. Vector Algebra: Dot and cross product , Scalar and vector triplet product
2. Complex Numbers: Representation , Modulus and Amplitude , De-Moivre theorem application in solving algebraic equations.

Unit -3: Trigonometry

1. Relation between sides and angles of a triangle : Statement of various formula showing Relationship between sides and angles of a triangle.
2. Inverse Circular Functions

Unit -4: Differential Calculus-I

1. Functions, limits, continuity , elementary methods of finding limit(right and left)
2. Differentiability, method of finding derivatives, functions of a function, Logarithmic Differentiation, Differentiation of Implicit functions.

Unit -5: Differential Calculus-II

1. Higher order derivatives
2. Derivatives of Special Functions (Exponential , Logarithmic , and Inverse circular functions)
3. Application : Finding Tangent, Rate Measure , Velocity and Acceleration

DAS-13 APPLIED PHYSICS-I

Topic Wise Distribution

S.no.	Topics	Marks Distribution
1	Unit & Dimensions	4
2	Errors & Measurement	4
3	Heat & Thermodynamics	5
4	Friction	4
5	Circular Motion	5
6	Motion of Planets & satellites	5
7	Dynamic of Rigid Body	6
8	Fluid Mechanics	6
9	Harmonic Motion	6
10	Acoustics	5
	Total	50

Detailed Contents

UNIT AND DIMENSION

Physical quantity and its types, Unit and its types, Definition of SI units, Dimensions of physical quantities, Dimensional formula and dimensional equation, Principle of homogeneity and its applications, Limitations of dimensional analysis

ERRORS AND MEASUREMENTS

Errors, Accuracy and Precision, Types of errors in measurement, Combination of errors, Significant figures, Rounding off

HEAT AND THERMODYNAMICS

Modes of heat transfer, Coefficient of thermal conductivity, Conduction through compound medium, Isothermal and Adiabatic process, Zeroth and First law of thermodynamics

FRICTION

Introduction, Physical significance of friction, Advantage and disadvantage of friction and its role in daily life, Coefficient of static and dynamic friction and their measurement, Angle of friction, Angle of repose, Motion of a body on an inclined plane

CIRCULAR MOTION

Uniform circular motion, Angular velocity and acceleration, Centripetal acceleration, Relation between linear and angular velocity and acceleration, Centripetal and centrifugal forces, Practical applications of centripetal forces

MOTION OF PLANETS AND SATELLITES

Gravitational force, Acceleration due to gravity and its variation with respect to height and depth from earth, Kepler's law, Escape and orbital velocity, Time period of satellite, Geo-stationary satellite

DYNAMIC OF RIGID BODY

Rigid body, Rotational motion, Moment of inertia, Theorems (parallel and perpendicular) of moment of inertia, Expression of M.I. of regular bodies (lamina, disc, sphere, cylindrical), Radius of gyration, Angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy, Rolling of sphere on the slant plane

FLUID MECHANICS

Surface tension, Capillary action and determination of surface tension from capillary rise method, Equation of continuity, Bernoulli's theorem and its application, Stream line and Turbulent flow, Viscosity, Stokes law, Reynold's number

HARMONIC MOTION

Periodic function, Characteristics of SMH, Equation of SMH and determination of velocity and acceleration, Simple pendulum and derivation of its periodic time, Spring-mass system, Energy conservation of SHM, Concept of phase, Definition of free, forced, damped and undamped vibrations, Resonance and its application, Q-factor

ACOUSTICS

Definition of pitch, loudness, quality and intensity of Sound waves, Echo, Reverberation and reverberation time, Sabine's formula without derivation, Acoustics of building defects and remedy

1. ATOMIC STRUCTURE :

Basic concept of atomic structure, Matter wave concept, Quantum number, Heisenberg's Uncertainty Principle, Shapes of orbitals.

2. CHEMICAL BONDING :

Covalent bond, Ionic & Co-ordinate, Hydrogen bonding, Valence bond theory, Hybridisation, VSEPR theory, Molecular orbital theory.

3. CLASSIFICATION OF ELEMENTS :

Modern classification of elements (s, p, d and f block elements), Periodic properties : Ionisation potential, electronegativity, Electron affinity.

4. ELECTRO CHEMISTRY-I:

Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases : Bronsted, Arrhenius and Lewis theory. Concept of pH and numericals. Buffer solutions,

Indicators, Solubility product, Common ion effect with their application,

5. ELECTRO CHEMISTRY-II:

Redox reactions, Electrode potential (Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electrochemical series and its application. Chemical and Electrochemical theory of corrosion, Galvanic Series. Prevention of corrosion by various methods.

6. CHEMICAL KINETICS :

Law of mass action, order and molecularity of reaction. Activation energy, rate constants, 1st order reactions and 2nd order reactions.

7. CATALYSIS :

Definition Characteristics of catalytic reactions, Catalytic promoters and poisons, Autocatalysis and Negative catalysis, Theory of catalysis, Application.

8. SOLID STATE :

Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

9. FUELS :

Definition, its classification, high & low Calorific value. Determination of calorific value of solid and liquid fuels by Bomb calorimeter. Liquid fuel - Petroleum and its refining, distillate of petroleum (Kerosene oil, Diesel and Petrol), Benzol and Power alcohol. Knocking, Anti-knocking agents, Octane number and Cetane number. Cracking and its type, Gasolining from hydrogenation of coal (Bergius process and Fischer-Tropsch's process) Gaseous Fuel - Coal gas, Oil gas, Water gas, Producer gas, Bio gas, LPG and CNG. Numerical Problems based on topics

10. WATER TREATMENT :

Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Only Soda lime, Zeolite and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge

formation, Corrosion, Caustic embrittlement, priming and foaming in boilers. Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorination, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

11. COLLOIDAL STATE OF MATTER :

Concept of colloidal and its types, Different system of colloids, Dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electrodialysis. Properties of colloidal solution with special reference to absorption, Brownian Movement, Tyndall effect, Electro phoresis and coagulation. relative stability of hydrophilic and hydrophobic colloids. Protection and protective colloids. Emulsion, Types, preparation, properties and uses. Application of colloids chemistry in different industries.

12. LUBRICANTS :

Definition, classification, Necessity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compounds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.

13. HYDROCARBONS:

- A. Classification and IUPAC nomenclature of organic compounds homologous series (Functional Group)
- B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

14. ORGANIC REACTIONS & MECHANISM:

1. Fundamental aspects -

- A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion
- B. Inductive effect, Mesomeric effect, Electromeric effect.
- 2.A. Mechanism of addition reaction (Markovnikov's Rule, Cyanohydrin and Peroxide effect),
- B. Mechanism of Substitution reactions; (Nucleophilic) hydrolysis of alkyl halide, electrophilic substitution halogenation, Sulphonation, Nitration and Friedel-Crafts reaction.
- C. Mechanism of Elimination reaction - Dehydration of primary alcohol, Dehydrohalogenation of primary alkyl halide.

15. POLYMERS :

- 1. Polymers and their classification. Average degree of polymerisation, Average molecular weight, Free radical polymerisation (Mechanisms)
- 2. Thermosetting and Thermoplastic resins -
 - A. Addition polymers and their industrial application - Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon.
 - B. Condensation polymer and their industrial application : Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Decron, Polyurethanes.
- 3. General concept of Bio polymers, Biodegradable polymers and inorganic polymers (Silicon).

16. SYNTHETIC MATERIALS :

- A. Introduction - Fats and Oils
- B. Saponification of fats and oils, Manufacturing of soap.
- C. Synthetic detergents, types of detergents and its manufacturing.
- 3. EXPLOSIVES: TNT, RDX, Dynamite.

4. Paint and Varnish

DAS-14P LIST OF PRACTICALS

1. To analyse inorganic mixture for two acid and basic radicals from following radicals:

A. Basic Radicals : NH_4^+ , Pb^{++} , Cu^{++} , Bi^{+++} , Cd^{++} , As^{+++} , Sb^{+++} , Sn^{++} , Al^{+++} , Fe^{+++} , Cr^{+++} , Mn^{++} , Zn^{++} , Co^{++} , Ni^{++} , Ba^{++} , Sr^{++} , Ca^{++} , Mg^{++}

B. Acid Radicals : CO_3^{--} , S^- , SO_3^- , CH_3COO^- , NO_2^- , NO_3^- , Cl^- , Br^- , I^- , SO_4^{--}

2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.

3. To determine the total hardness of water sample in terms of CaCO_3 by EDTA titration method using Eriochroma black-T indicator.

4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalein as indicator.

5. To determine the Chloride content in supplied water sample by using Mohr's method.

6. Determination of temporary hardness of water sample by O'Hene's method.

DDW-11 ENGINEERING DRAWING

1. Drawing, instruments and their uses.

1.1 Introduction to various drawing, instruments.

1.2 Correct use and care of Instruments.

1.3 Sizes of drawing sheets and their layouts.

2. (a) Lettering Techniques

1 Sheet

Printing of vertical and inclined, normal singlestroke capital letters. Printing of vertical and inclined normal singlestroke numbers. Stencils and their use.

(b) Introduction to Scales

2 Sheet

Necessity and use, R F Types of scales used in general engineering drawing. Plane, diagonal and chord scales.

3. Conventional Presentation:

2 Sheet

Types of lines, Conventional representation of materials, Thread (Internal and External), Conventional representation of machine parts, Welded joint.

4. (a) Principles of Projection

1 Sheet

Orthographic, Pictorial and perspective. Concept of horizontal and vertical planes. Difference between I and III angle projections. Dimensioning techniques.

(b) Projections of points, lines and planes.

2 Sheet

5 (a) Orthographic Projections of Simple Geometrical Solids

3 Sheet

Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles with reference planes.

(b) Orthographic views of simple composite solids from their isometric views.

(c) Exercises on missing surfaces and views

6. Section of Solids

2 Sheet

Concept of sectioning Cases involving cutting plane parallel to one of the reference planes and perpendicular to the others. Cases involving cutting plane perpendicular to one of the reference planes and inclined to the others plane, true shape of the section

7. Isometric Projection.

1 Sheet

Isometric scale Isometric projection of solids.

8. Free hand sketching

1 Sheet

Use of squared paper Orthographic views of simple solids Isometric views of simple job like carpentry joints

9. Development of Surfaces

2 Sheet

Parallel line and radial line methods of developments. Development of simple and truncated surfaces (Cube, prism, cylinder, cone and pyramid).

10. ORTHOGRAPHIC PROJECTION OF MACHINE PARTS:

3 Sheet

Nut and Bolt, Locking device, Bush Bearing

11. PRACTICE ON AUTO CAD :

2 Sheet

Concept of AutoCAD, Tool bars in AutoCAD, Coordinate System, Snap, Grid and Ortho mode. Drawing Command - 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.

NOTE :

A. The drawing should include dimension with tolerance wherever necessary, material list according to I.S. code.

25% of the drawing sheet should be drawn in first angle projection and rest 75% drawing sheet should be in third angle figure

B. Practice on AutoCAD latest software is to be done in AutoCADlab of Mechanical Engineering Department of the Institute.

DAS-22- Mathematics - II

Unit -1: Integral Calculus-I

Methods of finding indefinite integral

1. Integration by substitution
2. Integration by parts
3. Integration by partial fraction
4. Integration of special functions

Unit-2: Integral Calculus-II

1. Definite integral: definition and properties, Evaluation of integrals
2. Applications of definite integrals: Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution,
3. Numerical Integration: Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8 th rule

Unit-3: Coordinate Geometry-I

1. Circle : Equation of circle in standard form, centre –radius form , diameter form and two intercept form.
2. Standard form of curves and their simple properties:
 - Parabola
 - Ellipse
 - Hyperbola

Unit-4: Coordinate Geometry-II

1. Distance between two points in space , direction cosines and direction ratios, Finding equation of a straight line and shortest distance between two lines.
2. Sphere

DAS-23 Applied Physics-II

1. Optics

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Destructive), Diffraction and Polarization (Concept Only), Law of Malus and Polaroids.

2. Introduction To Fibre Optics :

Critical angle, Total internal reflection, Principle of fibre optics, Optical fibre, Pulse dispersion in step-index fibres, Graded index fibre, Single mode fibre, Optical sensor.

3. Lasers and its Applications

Absorption and Emission of energy by atom, Spontaneous and Stimulated Emission, Population inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :

Coulomb's Law, Electric field, Electric potential, Potential energy, Capacitor, Energy of a charged capacitor, Effect of dielectric on capacitors.

5. D.C. Circuits

Ohm's Law, Kirchhoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties:

Dia, Para and Ferro-magnetism, Ferrites, Magnetic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics

Concept of Energy bands in solids, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semiconductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transistor :

Majority and Minority charge carriers, P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics :

Concept of binary numbers, Interconversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT, OR).

10. Non-conventional energy sources:

(a) Wind energy : Introduction, scope and significance, measurement of wind velocity by anemometer, general principle of wind mill.

(b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

DAS-23P Applied Physics-II Lab

Note: Any 5 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.
2. Determination of 'g' by plotting a graph T^2 versus l and using the formula $g = 4\pi^2 / \text{Slope of the graph line}$
3. Determine the force constant of combination of springs in case of 1. Series 2. Parallel.
4. To verify the series and parallel combination of Resistances with the help of meter bridge.
5. To determine the velocity of sound with the help of resonance tube.
6. Determination of viscosity coefficient of a lubricant by Stoke's law.
7. Determination of E_1/E_2 of cells by potentiometer.
8. Determination of specific resistance by Carey Foster bridge.
9. Determination of resistivity by P.O.Box.
10. Verification of Kirchhoff's Law.
11. To draw Characteristics of p-n Junction diode.

DME-21 Applied Mechanics

1. Introduction:

Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

2.A. System of Forces :

Concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplanar concurrent force system.

B. General Condition of Equilibrium: General condition of equilibrium of a rigid body under the action of coplanar forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

3. Moment & couple:

Concept of Varignon's theorem. Generalised theorem of moments. Application to simple problems on levers - Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple; Simple applied problems such as pulley and shaft.

4. Friction:

Types of friction: static, limiting and dynamical friction, statement of laws of sliding friction, Coefficient of friction, angle of friction; problems on equilibrium of a body resting on a rough inclined plane, simple problems on friction. Conditions of sliding and toppling.

5. Machines:

Definition of a machine. Mechanical advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine. Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel.

6. Centre of Gravity:

Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphere and sphere, composite bodies and bodies with portion removed.

7. Moment of Inertia:

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section: rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus.

8. Beams & Trusses:

Definition of statically determinate and indeterminate trusses. Types of supports. Concept of tie & strut, Bow's notation, space diagram, polar diagram, funicular polygon; calculation of reaction at the support of cantilever and simply supported beams and trusses graphically and analytically; graphical solution of simple determinate trusses with reference to force diagram for determining the magnitude and nature of forces in its various members.

Analytical methods: method of joints and method of sections.

DME-21P Applied Mechanics Lab

1. To verify the law of Polygon of forces.
2. To verify the law of parallelogram and triangle of forces.
3. To verify the law of principle of moments.
4. To find the coefficient of friction between wood, steel, copper and glass.
5. To find the reaction at supports of a simply supported beam carrying point loads only.
6. To find the forces in the jib & tie of a jib crane
7. To find the forces in the members of a loaded roof truss. (King / Queen post truss)
8. To find the mechanical advantage, velocity ratio and efficiency of any three of the following machines:
 - (i) Simple wheel & axle
 - (ii) Differential wheel & axle
 - (iii) Differential pulley block
 - (iv) Simple Screw jack
 - (v) Simple Worm & worm wheel
 - (vi) System of Pulleys (any type).
9. To find out center of gravity of regular lamina.
10. To find out center of gravity of irregular lamina

DCE-21 Building Material

CONTENTS:

1. Building Stones:

Classification of rocks: Geological and physical classification; Common rock forming minerals; Testing of stones for specific gravity, water absorption, durability, weathering, hardness by Moh's scale, identification of rocks. Quarrying: Terminology used in quarrying; basic principles involved, methods of quarrying. Blasting: where used, principles of blasting, line of least resistance, drilling of holes (manually and mechanically), charging, tamping, firing, fuses and detonators, safety precautions, common explosives only names, their uses and storage. Wedging: where used, tools required and operation of wedging. Stone crushing: process & equipment used, crushers, grinding mills like hammer mill, ball mill & screens. Availability, characteristics and uses of the following stones: Granite, sandstone, limestone, dolomite, slate, basalt, trap, quartzite and marble. Availability of different stones in state.

2. Bricks and Clay Products:

Raw materials for brick manufacture, properties of good brickmaking earth, field testing of brick clay. Manufacture of bricks: Preparation of clay-manually/mechanically. Moulding: hand moulding and machine moulding. Drying of bricks. Burning of bricks. Clamps. Types of kilns, details of Bull's trench kiln and Hoffman's Kiln, process of burning, size of standard bricks. IS Classification of bricks as per IS:1077 and testing of common building bricks as per IS:3495 recommendations. Compressive strength, water absorption, efflorescence test; refractory bricks: composition, properties and uses. Building tiles: types wall, ceiling, roofing and flooring tiles, their properties, and uses. Other clay products: earthenware and stoneware, their properties and uses.

3. Lime

Natural sources of lime. Definitions of quick lime, fat lime, hydraulic lime, hydrated lime, lump lime, calcination, slaking, manufacture of lime. Process of setting and hardening action of lime. Field tests of lime as per IS 1624. Pozzolonic materials. Types, properties and uses.

4. Cement

Natural and artificial cement, raw materials, manufacture of ordinary portland cement, flow diagrams for dry and wet process. setting and hardening of cement, types of cement, properties of cement, tests of cement as per IS.

5. Timber and wood based Products:

Classification of trees. Cross-section of an exogenous tree and explanation of terms. Identification of different types of timber: teak, chir, shisham, sal, mango, deodar, kail etc. Market forms of converted timber as per IS. Seasoning of timber: purpose, types of sea-soning, air seasoning, water seasoning, kiln seasoning, chemical seasoning, Solar seasoning kiln. Defects in timber. Decay in timber. Preservation of timber and methods of treatment. Properties of good timber. Common structural timbers in India, their availability, and uses. Plywood, veneers; manufacture of plywood, uses of plywood. Other wood based product their brief description, manufacture and uses. Laminated boards: block boards, fibre boards, resistant board, hardboard, plastic coated finishes, water and fire resistant ply wood, PVC boards.

6. Paints

Various types of paints. Constituents of oil paints, their functions and properties. Cement paints, their properties and uses, Varnish and polish: types, properties and uses. Lacquers and enamels: their properties and uses. Trade names of different products.

7. Insulating Materials

Properties, uses and requirements of heat and sound insulating materials. Properties and uses of: cork, rock wool, glass wool, concrete, aluminium foil, asbestos sheets for ceiling, commercial names of different insulating materials.

8. Glass

Types of glasses and their properties: Sheet glass, plate glass, frosted glass, wired glass, fibre glass, bullet resisting glass, coloured glass and glass wool. Commercial sizes, forms and their uses.

9. Plastics

Methods of moulding and types, properties and uses of plastics. Important commercial product, uses of plastic in Civil Engineering: plastic pipes, taps, valves, plastic coated paper, polythene sheets, thermocole, bakelite, PVC, rexine and linoleum.

10. Water proofing materials.

List of water proofing materials, suitable for use in D.P.C., Basement floor and walls, Toilet, Kitchen, Roof Terraces, Water tanks, etc. Properties & commercial trade names.

11. Exposure to non conventional & waste by product

Fly ash, Stone Cladding and other finishing materials.

DCE-21P Building Material Lab

1. Identification of different types of stones and aggregates (visual identification).
2. Identification of timbers: teak, sal, chir, shisum, siras, deodar, kail and mango. (visual identification)
3. To conduct field tests of cement.
4. To determine normal consistency of cement.
5. To determine setting time (initial and final) of cement.
6. To determine fineness of given sample of cement.
7. To determine compressive strength of bricks.
8. To determine water absorption of bricks
9. To determine soundness of cement.
10. To identify hydraulic & fat lime.

DWP-21PWORKSHOP PRACTICE

1. Carpentry Shop :

EX-1 Introduction & demonstration of tools used in carpentry shop and different types of joints, types of wood, seasoning and preservation of wood

EX-2 Planing and sawing practice

EX-3 Making of lap joint

EX-4 Making of mortise and tenon joint

Ex-5 Making of any one utility article such as wooden picture frame, hanger, peg, name plate, etc.

2. Painting and Polishing Shop:

EX-1 Introduction of paints, varnishes, Reason for surface preparation, Advantage of painting, other method of surface coating i.e. electroplating etc.

EX-2 To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare french polish for wooden surface and polish the other side.

Ex-3 To prepare metal surface for painting, apply primer and paint the same.

EX-4 To prepare a metal surface for spray painting, first spray primer and paint the same by spray painting gun and compressor system.

* The sequence of polishing will be as below:

i) Abrasive cutting by leather wheel.

ii) Polishing with hard cotton wheel and with polishing material.

iii) Buffing with cotton wheel or buff wheel.

3. Sheet Metal and Soldering Shop :

EX-1 Introduction and Types of sheets, measuring of sheets

EX-2 Study and sketch of various types of stakes/anvil.

EX-3 Introduction & demonstration of tools used in Sheet metal working shop.

EX-4 Cutting, shearing and bending of sheet.

EX-5 To prepare a soap case by the metal sheet.

EX-6 To make a funnel with thin sheet and to solder the seam of the same.

EX-7 To make a cylinder and to solder the same.

EX-8 Preparation of different type of joints such as Lap joint-single seam, double seam. Hemp and wired joints.

EX-9 To braze small tube/conduit joints.

4. Fitting Shop, Plumbing Shop & Fastening Shop:

EX-1 Study of materials, limits, fits and tolerances.

EX-2 Introduction & demonstration of tools used in Fitting Shop.

EX-3 Hacksawing and chipping of M.S. flat. Filing and squaring of chipped M.S. job. Filing on square or rectangular M.S. piece.

EX-4 Making bolt & nut by tap and die set and make its joints

Ex-5 To drill a hole in M.S. Plate and tapping the same to create threads as per need.

EX-6 Utility article-to prepare double open mouth spanner for 18" hexagonal head of a bolt.

EX-7 Cutting and threading practice for using socket, elbow and tee etc. and to fit it on wooden practice board.

EX-8 Study of bib cock, cistern or stop cock, wheel valve and gate valve etc.

EX-9 Practice of bolted joints

EX-10 To prepare a rivetted joint

EX-11 To make a pipe joint

EX-12 To make a threaded joint

EX-13 Practice of sleeve joint

5. Foundry Work

Ex-1 Study of metal and non metals

Ex-2 Study & sketch of the foundry tools.

Ex-3 Study & sketch of cupola & pit furnace.

Ex-4 To prepare the green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould)

Ex-5 Casting of non ferrous (lead or aluminium) as per exercise 3.

6. Smithy Shop :

EX-1 Study & Sketch of Tools used in smithy shop.

EX-2 To prepare square or rectangular piece by the M.S. rod.

EX-3 To make a ring with hook for wooden doors.

EX-4 Utility article-to prepare a ceiling fan hook.

7. Welding Shop :

EX-1 Introduction to welding, classification of welding, types of weld joints.

EX-2 Welding practice-gas and electric.

EX-3 Welding for lap joint after preparing the edge.

EX-4 Welding of Butt joint after preparation of the edge.

EX-5 'T' joint welding after preparation of edge.

EX-6 Spot welding, by spot welding machine.

8. Machine Shop

EX-1 Study & sketch of lathe machine.

EX-1 Study & sketch of grinders, milling M/c, Drilling M/c and CNC Machines

Ex-2 Plain and step turning & knurling practice.

Ex-3 Study and sketch of planing/Shaping machine and to plane a Rectangle of cast iron.

DCS-21P COMPUTER APPLICATION FOR ENGINEERING LAB

1. Introduction to Computer:

Block Diagram of Computer, Types Of Computer Central Processing unit (Control unit, A.L.U.) & memory Unit. Types of Input and Output devices and memories. Visual Display Unit, Keyboard, Floppy disk drive, Hard disk drive, CD-ROM Drive, Magnetic & Tape Drive. Number system (Conversion) Binary, Octal, Hexa decimal number system, Conversion from Decimal to Other System and vice-versa Bit, Byte and Word.

2. INTRODUCTION TO OPERATING SYSTEMS (MS-DOS/MS-WINDOWS:)

What is operating system, its significance, Commands of DOS, Features/Application of window.

3. MS WORD:

File : Open, Close, Save, Save as, Search, Send to, Print Preview, Print and Page Setup Edit : Cut, Copy, Paste, Office Clipboard, Select All, Find, replace, Goto, etc. View : Normal/Web Layout/Print Layout; Tool Bars; Header/Footer; Zoom, etc. Insert: Break, Page Number, Date & Time, Symbol, Comment, Reference, etc. Format: Font, Paragraph, Bullets & Numbering, Borders & Shading, Column, Change case, Back ground, etc. Tools : Spelling & Grammar, Language, Word Count, Letters & Mailing, Options, Customize, etc. Table : Draw, Insert, Delete, Select, Auto Format, AutoFit, Convert, Sort, Formula, etc.

4. MS EXCEL:

Introduction, Use of Tools/Icons for preparing simple applications.

5. MS POWER POINT :

Introduction, Use of Tools/Icons for preparing simple presentation on Power Point.

6. MS ACCESS :

Introduction, Use of Tools/Icons for preparing simple applications.

7. Introduction to Internet:

What is Network, How to send & receive messages, Use of Search Engines, Surfing different web sites. Creating Mail ID, Use of Briefcase, Sending./replying emails.

8. Concept of Programming :

Flowcharting, Algorithm techniques, etc.

List Of Practicals

1. Practice on utility commands in DOS.
2. Composing, Correcting, Formatting and Article (Letter/Essay/Report) on MS Word and taking its print out.
3. Creating, editing, modifying tables in MS ACCESS.
4. Creating labels, report, generation of simple forms in MS ACCESS.
5. Creating simple spread sheet, using in built functions in MS EXCEL.
6. Creating simple presentation on Power Point.
7. Creating mail ID, Checking mail box, sending/replying emails.
8. Surfing web sites, using search engines.

SECOND YEAR

[DEM-31] ELEMENTRY ELECTRICAL & MECHANICAL ENGG.

(A) Elements of Mechanical Engineering

1. Construction and working of I.C. Engines, their classifications (2 stroke and 4 stroke), details of 4 stroke I.C. Engines.
2. Types of compressors and their uses
3. Different type of gears and their applications.
4. Conveyers, hoists and other material handling equipments-their functioning and uses.
5. Different kinds of lathes, milling machines and drilling machines.
6. Different kinds of Jacks & Hammers and their uses.

(B) Elements of Electrical Engineering

1. A.C.Machines

- (a) Transformers (b) Alternators (c) Induction Motor - their types, uses and Physical & Electrical specification.
2. General idea of electrical measuring instruments like Ammeter, Voltmeter, Wattmeter and Megger and their uses.
3. Different types of lamps like incandescent lamps, sodium vapour lamps, fluorescent tube. Halogen lamps - CFL, their merits, demerits and use.
4. Bye laws pertaining to electrical installations, Fans and AC's different types of artificial lighting systems, Lighting systems for residential buildings, public building, schools, colleges, hotels, hospital, exhibition hall, library etc.(IS)
5. Simple electrical circuits used in house wiring
6. Earthing - need and procedure.
7. Safety against electrical shocks.

[DME-34] STRENGTH OF MATERIALS

DETAILED CONTENTS

1. Principal Stress and Principal Planes : Principal stress and principal plane under direct and shear stress. Graphical determination by Mohr's circle method.
2. Bending Moment and Shear Force: Concept of a beam, and supports (Hinged, Roller and Fixed). Types of Beams: Simply supported, cantilever, fixed, overhang and continuous beams. Types of loads (distributed, point and varying). Concept of Bending Moment & Shear Force. Sign conventions. Bending moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to uniformly distributed, concentrated and uniformly varying loads. Relationship between load, shear force and bending moment. Point of maximum B.M. and contraflexure, concept of fixed and continuous beams.
3. Bending and Shear Stresses
Assumption of theory of simple bending. Derivation of the equation. $M/I = F/Y = E/R$. Concept of centroid and second moment of area, Radius of gyration, Theorems of parallel and perpendicular axes, Second Moment of area for sections: rectangle, triangle, circle, trapezium, angle, Tee, I, Channel and compound sections. Moment of resistance, section modulus and permissible bending stresses, Bending stresses in circular rectangular, I, T and L section. Comparison of strength of the above sections. Concept of shear stresses in beams, Shear stress distribution in rectangular, I and T section.
4. Combined Direct & Bending Stresses: Concentric and eccentric loads, eccentricity, effect of eccentric load on the section, middle third rule; stresses due to eccentric loads. Examples in the case of short columns, chimneys and dams.
5. Slopes and Deflections of Beams: Definition of slope and deflection, sign convention. Circular bending. Calculation of maximum slope and deflection for the following standard cases by double integration or moment area method.
(1) Cantilever having point load at the free end. Cantilever having point load at any point of the span. Cantilever with uniformly distributed load over the entire span. Cantilever having U.D.L. over part of the span from free end. Cantilever having U.D.L. over a part of span from fixed end.
(2) Simply supported beam with point load at centre of the span.
Simply supported beam with U.D. load over entire span.
NOTE: All examples will be for constant moment of inertia without derivation of formula.
6. Columns & Struts: Definition of long column, short column and strut, slenderness ratio, equivalent length, critical load, collapse Load, End conditions of column. Application of Euler's and Rankine's formula (no derivation), simple numerical problems based on Euler's and Rankine's formulae.
7. Torsion :- Definition of torque and angle of twist. Derivation of torsion equation. Polar moment of inertia. Strength of hollow and solid shaft, advantage of a hollow shaft over a solid shaft. Comparison of weights of solid and hollow shafts for same strength. Horse Power transmitted. Calculation of shaft diameter for a given Horse Power.
8. Fixed and Continuous Beam: Effect of fixing and continuity, fixed beams with point loads and U.D. Load. Continuous beam of uniform section covering three spans with free ends (supports being at the same level) B.M. & S.F. Diagram. Points of Contraflexure of fixed and continuous beams.

[DME-34P] STRENGTH OF MATERIALS LAB

1. Determination of shear force at different sections on a simply supported beam under point loads.
2. Determination of bending moment at different sections on a simply supported beam under different types of loading.
3. Determination of yield stress, ultimate stress, percentage elongation, plot the stress strain diagram and compute the value of Young's Modulus of mild steel.

4. Determination of the maximum deflection and Young's Modulus of elasticity by deflection apparatus.
5. Determination of modulus of rigidity of material by Torsion apparatus.
6. Determination of stiffness/deflection of a helical spring.
7. Determination of hardness of a metal plate by Rock Well Brinell hardness testing machine.
8. To perform impact test on Izod Impact testing machine.

[DCE-31] HYDRAULICS

1. Introduction:

- 1.1 Fluid : Real fluid, ideal fluid.
- 1.2 Fluid Mechanics, Hydraulics, Hydrostatics, Hydrokinematics and Hydrodynamics.

2. Properties of Fluids

- 2.1 Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility.

3. Hydrostatic Pressure:

- 3.1 Pressure, intensity of pressure, pressure head, Pascal's law and its applications.
- 3.2 Total pressure, resultant pressure, and centre of pressure.
- 3.3 Total pressure and centre of pressure on vertical and inclined plane surfaces:
 - 3.3.1 Rectangular
 - 3.3.2 Triangular
 - 3.3.3 Trapezoidal
 - 3.3.4 Circular

4. Measurement of Pressure

- 4.1 Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.
- 4.2 Piezometers, simple manometer, differential manometer and mechanical gauges. Measurement of pressure by manometers and pressure gauges.

5. Fundamental of Fluid Flow

5.1 Types of Flow:

- 5.1.1 Steady and unsteady flow
- 5.1.2 Laminar and turbulent flow
- 5.1.3 Uniform and non-uniform flow.
- 5.2 Discharge and continuity equation (flow equation)
- 5.3 Types of hydraulic energy.

5.3.1 Potential energy

5.3.2 Kinetic energy

5.3.3 Pressure energy

5.4 Bernoulli's theorem; statement and description (without proof of theorems).

5.5 Venturimeter (horizontal and inclined) and Orifice Plate meter.

6. Orifice:

- 6.1 Definition of Orifice, and types of Orifices,
- 6.2 Hydraulic Coefficients.
- 6.3 Large vertical orifices.
- 6.4 Free, drowned and partially drowned orifice.
- 6.5 Time of emptying a rectangular/circular tanks with flat bottom.

7. Flow through Pipes

- 7.1 Definition, laminar and turbulent flow explained through Reynold's Experiment.
- 7.2 Reynolds Number, critical velocity and velocity distribution.
- 7.3 Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, obstruction and change of direction (No derivation of formula)
- 7.4 Hydraulic gradient line and total energy line.
- 7.5 Flow from one reservoir to another through long pipe of uniform and composite section.
- 7.6 Water Hammer Phenomenon and its effects. (only elementary treatment)

8. Flow through open channels.

- 8.1 Definition of a channel, uniform flow and open channel flow .
- 8.2 Discharge through channels using
 - (i) Chezy's formula (no derivation)
 - (ii) Manning's formula
- 8.3 Most economical sections

- (i) Rectangular
- (ii) Trapezoidal
- 9. Flow Measurements
 - 9.1 Measurement of velocity by
 - (i) Pitot tube (iii) Surface Float
 - (ii) Current-meter (iv) Velocity rods.
 - 9.2 Measurement of Discharge by a Notch
 - 9.2.1 Difference between notches and orifices.
 - 9.2.2 Discharge formulae for rectangular notch, triangular Notch, trapezoidal notch, and conditions for their use. (with derivation)
 - 9.3 Measurement of discharge by weirs.
 - 9.3.1 Difference between notch, weir and barrage.
 - 9.3.2 Discharge formula for free, drowned, and broad crested weir with and without end contractions ; velocity of approach and condition of their use.
 - 9.3.3 Venturi flumes to measure flow.
 - 9.4 Measurement of Discharge by velocity area-method.
- 10. HYDRAULIC MACHINE :
 - 10.1 Reciprocating pumps
 - 10.2 Centrifugal pumps
 - 10.3 Impulse Turbines
 - 10.4 Reaction Turbines Sketching and description of principles of working of above mentioned machines

[DCE-31P] HYDRAULICS LAB

- (i) To verify Bernoulli's Theorem.
- (ii) To find out venturimeter coefficient.
- (iii) To determine coef. of velocity (C_v), Coef. of discharge (C_d) Coef. of contraction (C_c) and verify the relation between them.
- (iv) To perform Reynold's Experiment.
- (v) To determine Darcy's coefficient of friction for flow through pipes.
- (vi) To verify loss of head due to:
 - (a) Sudden enlargement
 - (b) Sudden Contraction.
- (viii) To determine velocity of flow of an open channel by using a current meter.
- (ix) To determine coefficient of discharge of a rectangular notch/triangular notch.
- (x) Study of the following
 - (i) Reciprocating Pumps or Centrifugal Pumps.
 - (ii) Impulse turbine or Reaction turbine
 - (iii) Pressure Gauge/water meter/mechanical flow meter/ pitot tube.

[DCE-32] PUBLIC HEALTH ENGG.

- (A) Water Supply Engg.
 - 1. Introduction :-Necessity and brief description of water supply system. Water requirement: Per capita consumption for domestic, industrial, public and firefighting uses as per IS standards. Consumption, demand and its variation.
 - 2. Sources of Water
 - a. Surface water sources : Rivers, canal, inponding reservoir and lakes, their quality of water and suitability.
 - 3. Water Treatment Suspended, colloidal and dissolved impurities. Physical, chemical and bacteriological tests and their significance. Minimum standards required for drinking water, Principles of Sedimentation, Coagulation, Flocculation, Filtration, Disinfection (Chlorination) including Jar Test, Break point chlorination, Residual chlorine. Flow diagram of different treatment units. Function, constructional details, working and operation of

- (i) Aeration fountain (ii) Mixer (iii) Flocculator
- (iv) Clarifier (v) Slow and rapid sand filter
- (vii) Chlorination chamber (viii) Water softening
- (ix) Removal of Iron and Magnese.

Chemicals required for water treatment, their uses, and feeding devices. Simple design of sedimentation tank, and filters.

4. Water Distribution

(i) Pipes:

Different types of Pipes: Cast iron, steel, plastic, (PVC, LDPE, HDPE), asbestos cement, concrete, plastic, GI and lead pipes. Details of their sizes, joints and uses.

(ii) Appurtenances: Sluice (Gate and spindle), air, reflux, scour and safety valves, fire hydrants, their working and uses.

(iii) Distribution system: Requirements of distribution: Minimum head and rate. Types of lay out-dead end, grid, radial and ring systems. System of water supply-intermittent and continuous. Service reservoirs-types, necessity and accessories.

(iv) Storage: Necessity, types of storing tanks: G.I. Sheet Tank, P.V.C. tank, over head tanks.

5. Laying of Pipes: Setting out alignment of pipe line. Excavation in different types of soils and precautions taken. Precautions taken for traffic control, bedding for pipe line. handling, lowering, laying and jointing of pipes, testing of pipe lines and back filling. Use of boning rods.

6. Building Water Supply

(i) General layout of water supply arrangement for a building (single and multistoried) as per IS Code of practice. Water supply fixtures and their installation. Tapping of water mains.

(ii) Hot and Cold Water supply in buildings. Use of Solar water heaters.

(iii) Rural water supply: Sources, treatment and distribution.

7. Maintenance :- Leakage detection and prevention. Replacement of damaged pipe. Maintenance of domestic plumbing fixtures.

(B) SANITARY ENGINEERING

8. Introduction: Waste: Dry, semiliquid, liquid, Necessity of systematic collection and disposal of waste. Brief description of sewage disposal system. Conservancy and water carriage system, their advantages and disadvantages.

9. Quantity of Sewage:

(i) Sewage: Domestic, industrial and storm water.

(ii) Volume of domestic sewage (DWF), variability of flow, limiting velocities in sewers.

(iii) Use of table as per I:S 1742-1983 to determine relationship between gradient, diameter, discharge and velocity.

10. Sewerage Systems:

(i) Types of sewerage systems separate, combined and partially separate.

(ii) Sewers : Stone ware, cast iron, concrete and masonry sewers their sizes and joints.

(iii) Appurtenances: (Location, function and construction) manholes, drop manhole, lamp hole catch basin, inverted syphon, flushing tanks, ventilating shafts and storm water flows.

(iv) Laying of sewers: Setting out alignment of sewer.

Excavation, checking the gradient with the help of boning rods, preparation of bedding, handling, lowering, laying and jointing, testing and backfilling.

(v) Construction of surface drains and different sections required.

11. Building Drainage

(i) Aims of building drainage and its requirements. General layout of sanitary fittings and house drainage arrangement for a building (single and multistoried) as per IS 1742-1983.

(ii) Different sanitary fittings and their installation.

(iii) Traps, seal in traps, causes of breaking of seal, precautions taken, Gulley, Intercepting and Grease traps.

(iv) Testing of house drainage.

12. Rural Sanitation:

(a) Drainage: Topography, alignment of lanes and byelanes, storm water, natural passage, development of drains, alignment, size and gradient. Phase Programme.

(b) Disposal of night soil and village latrines :

(i) Collection and disposal of garbage and refuse.

(ii) Septic tanks, cess pools/soak pit (design of septic tank, soak pit/cess pools), privy pit and bore hole latrines.

(iii) Biogas plant, constructional details, uses and maintenance.

(c) Guide lines for future development of village.

13. Maintenance: Inspection of mains, cleaning and flushing of sewers.

Precautions during cleaning, maintenance of traps, cleaning of house drainage line. Tools and equipment needed for maintenance.

14. Sewage Disposal

(i) General composition of sewage, importance & method of determination of O.D., B.O.D. and C.O.D.

(ii) Disposal methods. Land disposal, disposal by dilution and disposal in sea. Merits and demerits.

(iii) Nuisance due to disposal, self purification of streams, conditions of disposal.

15. Sewage Treatment:

(i) Meaning and principle of primary and secondary treatment, constructional details of screening chamber, grit chamber, clarifier, trickling filters, secondary clarifiers/aeration tank.

(ii) Sludge treatment, sludge digestion, sludge drying; sludge disposal.

(iii) Oxidation ponds. Practicals

[DCE-32P] PUBLIC HEALTH ENGG. LAB

1. To determine dissolved and suspended solids in water.
2. To determine pH value of water sample.
3. To determine turbidity of water.
4. To calculate :
 - i. Oxygen Demand (OD)
 - ii. Biological Oxygen Demand (BOD)
 - iii. Chemical Oxygen Demand (COD)
5. To determine residual chlorine in water sample.
6. To perform Jar Test for Coagulants.
7. To collect samples of water from shallow & deep wells.
8. To perform chlorine demand test.
9. To determine hardness of water.
10. To determine available chlorine in bleaching powder.
11. To perform field test for the detection of intermediate pollution in drinking water by OT test.
12. To visit and write specific report for the following.: (Any three)
 - a. Water treatment plant for moderate town (say Population 1 lacs)
 - b. Sewage treatment plant for 5 lac to 10 lac population
 - c. Sewage disposal work
 - d. Construction site for layout of water supply & sewerage system.
 - e. Industrial effluent treatment plant

[DCE-33] SURVEYING-I

1. Introduction

Concept of surveying, purpose of surveying, Measurements linear and angular, units of measurement, instruments used for taking these measurements. Classification of survey based on instruments. Basic principles of surveying.

2. Chain Surveying :-Purpose of chain surveying, Principles of chain surveying. Equipment used in chain surveying
Viz. chains, tapes, ranging

rods, arrows, pegs, cross staffs, Indian optical square

their construction and uses. Different operations in chain surveying: Ranging (direct/indirect), offset (perpendicular/oblique), chaining (flat and sloping ground), conducting chain survey over an area. Recording the field data, plotting the chain survey, conventional sign. Obstacles in chain surveying.

(a) Errors in chain surveying.

(b) Correction for erroneous length of chain, simple problems. Testing and adjustment of chain.

3. Compass Surveying :-Purpose of compass surveying. Construction and working of prismatic compass. Use of prismatic Compass, Method of setting and taking observations. Concept of following:

(a) Meridian - Magnetic, true and arbitrary.

(b) Bearing- Magnetic, true and arbitrary.

(c) Whole circle bearing and reduced Bearing,

(d) Fore and back bearing.

(e) Magnetic dip and declination

Local attraction-causes, detection, errors and correction. Problems on local attraction, magnetic declination and calculation of included angles in a compass traverse. Concept of a traverse-Open and closed traverse. Traversing with a prismatic compass. Checks for an open and closed traverse. Plotting of a traverse - By included and deflection angles. Concept of closing error. Adjustment of traverse graphically by proportionate method. Errors in compass surveying. Testing and adjustment of a prismatic compass. Use of surveyors compass and its construction details, comparison with prismatic compass.

4. Levelling:-

Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and bench marks. Principle and construction of dumpy, I.O.P. (tilting) levels. Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis. Levelling staff (i) single piece (ii) folding (iii) spirit level (iv) invar precision staff. Temporary adjustment: setting up and levelling, adjusting for parallax of Dumpy and I.O.P. level. Differential levelling, concept of back sight, fore sight, intermediate sight, station, change point, height of instrument. Level book and reduction of levels by (a) Height of collimation method and (b) Rise and fall method. Arithmetical checks. Problem on reduction of levels. Fly levelling, check levelling and profile levelling (L-section and X-section) Errors in levelling, and precautions to minimise them and permissible limits. Reciprocal levelling. Difficulties in levelling. Concept of curvature and refraction. Testing and adjustment of dumpy and IOP level. Numerical problems.

5. Minor Instruments : Principle construction and uses of the following minor instruments:

- (a) Abney's level
- (b) Tangent clinometer
- (c) Ceylone Ghat Tracer
- (d) Pentagraph
- (e) Planimeter

[DCE-33P] SURVEYING-I LAB

Chain Surveying

Ex.(i) (a) Ranging a line.

(b) Chaining a line and recording in the field book.

(c) Testing and adjustment of chain.

Ex.(ii) (a) Chaining of a line involving reciprocal ranging.

(b) Taking offsets and setting out right angles with cross staff and Indian optical square.

Ex.(iii) Chain survey of a small area. Plate I

Ex.(iv) Chaining a line involving obstacles in ranging. Compass Survey

Ex.(v) (a) Setting the compass and taking observations.

(b) Measuring angles between the lines meeting at a point by prismatic compass.

Ex.(vi) Traversing with the prismatic compass and chain of a closed traverse. (recording and plotting by included angles)

Plate II Setting a regular Pentagon of given side & bearing

Plate III

Ex.(vii) Traversing with the Prismatic compass and chain of a closed and open traverse (Recording and plotting by deflection angles) Plate IV

Ex.(viii) Determination of local attraction at a station by taking fore and back bearing.

Ex.(ix) To find true bearing of a line at a place.

Levelling:

Ex.(x) To find the difference of level between two distant points by taking staff readings on different stations from the single setting.

Ex.(xi) To find the difference of level between two points by taking at least four change points.

Ex. (xii) Longitudinal sectioning of a road. Plate V

Ex.(xiii) Cross-sectioning of a road. Plate VI

Ex.(xiv) Setting a gradient by IOP level.

Minor Instrument :

Ex.(xv) Setting and checking grades with Abney's level. Setting and checking grades with Ceylone Ghat Tracer.

Ex.(xvi) Finding heights by Indian Pattern Clinometer (Tangent Clinometer)

Ex.(xvii) Use of planimeter for computing areas.

Ex.(xviii) Enlargement/ reduction of a plan by the use of pentagraph.

[DCE-41] SOIL MECHANICS AND FOUNDATION ENGINEERING

Supervision of earth work in the construction of dams, road embankment, pavement and other Civil Engineering structures, is one of the important functions of a civil engineering technician. The analysis of these functions indicate that basic knowledge of soil mechanics, a modern subject in the field of civil engineering is essential for the engineers for the safe construction. The topics will cover only elementary knowledge of the subject dealing with formation and properties of soil, definitions etc, so that technician is able to identify their common types, their selection and proper use in the field of engineering construction. Weight and volume relationship. Index properties, grain size analysis and classification, field identification, permeability shear strength, compaction, consolidation, earth pressure, and retaining structures. Shallow and deep foundations, bearing capacity, sub-surface explorations are dealt with. Finally to develop skills in identification of soil type suitable laboratory work with simple equipments is also suggested. Teaching should cover the field practices where ever applicable.

TOPIC WISE DISTRIBUTION OF PERIODS

1. Introduction

- 1.1 Definition of soil Mechanics and foundation engineering.
- 1.2 Soil formation - different kinds of soils and soil structures.

2. Fundamental Definitions and their Relationships

- 2.1 Graphical representation of soils as a three phase system.
- 2.2 Definitions of moisture content unit weight of soil mass such as bulk density, saturated density, submerged density and dry density, specific gravity, mass specific gravity, void ratio, porosity and degree of saturation, percentage air voids and their content, density index.
- 2.3 Relationships between various terms stated above.
- 2.4 Consistency limits Liquid limit, Plastic limit, Shrinkage limit, Plasticity index, Consistency index.
- 2.5 Grain size analysis - Sieve and Hydrometer analysis, C.C. and C.U.

3. Classification of Soils

- 3.1 Particle size classification - M.I.T., and I.S., U.S. bureau of soils and U.S. P.R.A.
- 3.2 Textural classification chart, brief description of plasticity chart.
- 3.3 I.S. soil classification.

4. Permeability of Soils

- 4.1 Definition of permeability.
- 4.2 Interpretation of Darcy's law, definition of discharge, velocity and seepage velocity and coefficient of percolation.
- 4.3 Factors affecting permeability.
- 4.4 Laboratory methods of falling head and constant head, field methods of pumping-out tests and pumping-in tests.

5. Compaction

- 5.1 Definition of Compaction.
- 5.2 Standard & modified Proctor compaction test.
- 5.3 Different methods of compaction.
- 5.4 Factors affecting compaction.
- 5.5 Brief description of field compaction methods.
- 5.6 Compacting equipments and field control.
- 5.7 Indian Standards.

6. Consolidation

- 6.1 Definition of consolidation and its importance on foundation settlement.
- 6.2 Difference between consolidation and compaction.

7. Shear Strength

- 7.1 Definition of shear strength.
- 7.2 Definition of Cohesive & noncohesive soil. with reference to c and ϕ soil.
- 7.3 Coulomb's equation.
- 7.4 Shear box and unconfined compression tests.

8. Earth Pressure and Retaining Structures

- 8.1 Definition of earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall.
- 8.2 Relation between movement of wall and earth pressure
- 8.3 K_a and K_b by Rankin's Method.
- 8.4 Simple earth pressure calculations without surcharge.

9. Shallow and Deep Foundations

- 9.1 Definitions of shallow and deep foundations
- 9.2 Application of Terzaghi's bearing capacity formulae for different types of foundations.
- 9.3 Factors affecting depth of shallow foundation
- 9.4 Plate load test for shallow foundations

10. Ground Improvement Techniques

Concept of stabilization, materials used, advantages of lime & cement as stabilizing agents. Strength of stabilized soil.
Deep compaction - Heavy tamping, Explosion, Grouting, Reinforcement.

- 11. Soil Exploration and sampling
- 12.1 Methods of exploration
- 12.2 Types of soil samples and samplers

[DCE-41P] SOIL MECHANICS LAB

- 1. Determination of moisture content by oven drying method
- 2. Determination of specific gravity of soil particles by specific gravity bottle/pycnometer
- 3. Determination of soil particles size distribution by sieving
- 4. Determination of liquid limit and plastic limit of soil
- 5. Determination of permeability by constant Head Permeameter and falling head permeameter.
- 6. Shear strength of sand by Direct Shear test.
- 7. Unconfined compression test
- 8. Standard Proctor compaction test.
- 9. Determination of field density of soil by sand replacement and core cutter methods.
- 10. Demonstration of Standard Penetration Test.

[DCE-42] BUILDING CONSTRUCTION AND MAINTENANCE ENGG.

1. Introduction:

- (i) Definition of a building, classification of buildings based on occupancy.
- (ii) Different parts of a building. Orientation of buildings. Site selection.
- (iii) Exposure to building bylaws/master plan and building approval.

2. Foundation

- (i) Concept of foundation and its purpose.
- (ii) Types of foundations-shallow and deep.
 - (a) Shallow foundation - Constructional details of: Spread foundations for walls, Thumb rules for depth and width of foundation and thickness of concrete block stepped foundation, masonry pillars and concrete columns, raft foundation, Grillage foundation and machine foundation.
 - (b) Deep foundations. Pile foundations, their suitability, classification of piles according to function, material and installation of concrete piles (underreamed, bored, compacted).
 - (c) Construction-preparing foundation plans, setting out, excavation, timbering and dewatering. Well point system.

3. Walls

- (i) Purpose of walls;
- (ii) Classification of walls-Load Bearing and Non Load Bearing. Dwarf wall.
- (iii) Classification of walls as per materials of construction, brick, stone, reinforced brick, reinforced concrete, precast hollow and solid concrete block and composite masonry walls.

(iv) Brick masonry-Definition of terms; mortar, bond, facing, backing, hearting, column, pillar, jambs, reveals, soffit, plinth, plinth masonry, Brick: header, stretcher, bed of brick, bat, queen closer, king closer, frog and quoin.

(a) Bond-Meaning and necessity: Types of bond and their suitability (English, Flemish, Header and Stretcher) 1, 1-1/2 and 2 Brick thick walls in English Bond. T, X and right angled corner junctions. Sketches for 1, 1-1/2 and 2 brick square pillars in English Bond.

(b) Construction of Brick walls-Method of laying bricks in walls, precautions observed in the construction of walls, method of bonding new brick work with old (Toothing, raking back and block bonding).

(c) Construction and Expansion Joints.

(v) Stone Masonry

(a) Glossary of terms-Natural bed of a surface, bedding planes, string course, corbel, cornice, block-in-course, grouting, mouldings, templates, throating, through stones, parapet, coping, spalls, pilaster and buttress.

(b) Types of Stone Masonry: Rubble Masonry; random and coursed, Ashlar Masonry, Ashlar fine, Ashlar rough-tooled Ashlar facing, specifications for coursed rubble masonry, principles to be observed in construction of stone masonry walls.

vi) Partition walls: Constructional details, suitability and uses of brick and wooden partition walls.

(vii) Mortars-preparation, use and average strength of cement, lime, lime cement, lime surkhi and mud mortar.

(viii) Scaffolding: Constructional details and suitability of Mason's Brick Layers and Tubular scaffolding Centering & Shuttering.

(ix) Shoring & underpinning: Types and uses.

(x) Safety in construction of low rise and high rise buildings.

4. Arches and Lintels

(i) Meaning and use of Arches and Lintels.

(ii) Glossary of terms used in Arches and Lintels- Abutment, Peir, Arch ring, Intrados, Soffit Extrados, Voussoirs, Springer, Springing line, Crown, Key stone, Skew back, Span, Rise, Depth of an Arch, Haunch, Spandril, Jambs, Bearing, Thickness of lintel, Effective span.

(iii) Arches:

(a) types of Arches-Semi circular, segmental, elliptical and parabolic, flat, inverted and relieving.

(b) Stone arches and their construction.

(c) Brick arches and their construction.

5. Doors and windows:

(i) Glossary of terms, used in Doors and Windows.

(ii) Doors-Name; uses and sketches of Metal doors; Ledged and Battened Doors; Ledged, battened and braced door; Framed and Panelled doors; glazed and panelled doors; flush doors; collapsible doors; Rolling steel shutters, side sliding doors; Door frames, PVC shutters & metal doors.

(iii) Windows-names, uses and sketches of metal windows, fully panelled windows, fully glazed windows, casement windows, fanlight windows and ventilators, sky light window frames, Louvered shutters (emphasis shall be given for using metals and plastics etc. in place of timber).

6. Damp Proofing

(i) Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, damage to aesthetic appearance. Damage to heat insulating materials, Damage to stored articles and health.

(ii) Types of dampness-moisture penetrating the building from outside e.g. rainwater, surface water, ground moisture. Moisture entrapped during construction i.e. moisture in concrete, masonry construction and plastering work etc. Moisture which originates in the building itself i.e. water in kitchen and bath rooms etc.

(iii) Damp proofing materials and their specifications rich concrete and mortar, bitumen, bitumen mastic.

(iv) Methods of damp proofing basement, ground floors, plinth and walls, special damp proofing arrangements in bathrooms, W.C. and Kitchen, Damp Proofing for roofs and window sills.

(v) Plinth Protection and Aprons.

7. Floors

(i) Ground floors:

(a) Glossary of terms-floor finish, topping, under layer, base course, rubble filling and their purpose.

(b) Types of floor finishes-cast in situ concrete flooring (monolithic, bonded) Terrazzo tile flooring. Terrazzo flooring, Timber flooring. Description with sketches of the methods of construction of the floors and their specifications. Floor polishing equipment.

(ii) Upper floors:

- (a) Flooring on RCC Slab.
- (b) Flooring on R.B. Slab.

8. Roofs:

- (i) Glossary of terms for pitched roofs-batten, eaves, barge, fascia board, gable hip, lap, purlin,rafter, rag bolt, valley,ridge.
- (ii) Pitched roof, steel trusses, fink truss, arched trusses, North light truss.
- (iii) Roof coverings for pitched roofs-Asbestos sheeting, big six,trafford sheets, Mangalore tiles, method of arranging and fixing to the battens, rafters,purlins-both steel and wooden.
- (iv) Drainage arrangement for pitched roofs.
- (v) Concept of Flat roofs, RCC, RB, Coffe & folded slabs.
- (vi) Drainage arrangements for flat roofs.

9. Stairs and staircase:

- (i) Glossary of terms:Stair case winders landing, strings, newel, baluster,riser,tread,width of staircase, hand rail, nosing.
- (ii) Planning and layout of staircase: Relations 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 stair

10. Surface Finishes:

- (i) Plastering-Classification according to use and finishes like grit finish, rough cast, pebble dashed, plain plaster etc. Dubbing, Proportion of mortars used for different plasters, preparation of mortars, techniques of plastering and curing.
- (ii) Pointing-Different types of pointing, mortar used and method of pointing.
- (iii) Painting-preparation and application of paints on wooden,steel and plastered wall surfaces.
- (iv) White washing, colour washing and distempering. Application of cement and plastic paints.
- (v) Commonly used water repelants for exterior surfaces,their names and application.

11. Ventilation and Air Conditioning

Natural and Artificial Ventilation. Requirements of comfort conditions, temperature control, mechanical ventilation, plenum system, exhaust system,air filter of different types, principle of Air Conditioning Plant

12. Fire Fighting

Causes of fire, spread of fire, fire fighting equipment and different method, of fire fighting, sprinklers, fire regulations and requirement. Fire insurance. Indian Standard.

13. Principles of Maintenance

- 13.1 Definition, of maintenance, decay and deterioration of building/building components.
- 13.2 Sources and causes of deterioration and decay in building.
- 13.3 Factors influencing the decision to carry out maintenance of building.

14. Maintenance Practice

14.1 Defects, causes and repairs in structural elements of buildings such as

- (i) Foundation
- (ii) Walls
- (iii) Floors
- (iv) Roof
- (v) Components such as doors, windows and ventilators etc.

14.2 Defects, causes and repairs in surface finishes such as

- (i) White and colour washing
- (ii) Distempering
- (iii)Cement Plastering,
- (iv) Painting of timber and steel surface

14.3 Defects, causes and repairs in building due to leakage and seepage & their prevention

14.4 Defects causes and repair in internal environment of building such as

- (i) Heating
- (ii) Ventilation and Air conditioning
- (iii) Lighting

14.5 P.W.D. Practices with respect to maintenance of building e.g. annual repairs, special repairs.

15. Safety in Maintenance

Necessity, specific safety measures at site e.g. barricades, signals, helmets.

16. Water Harvesting :

- i. Causes of depletion of water label in state.
- ii. Present scenerio of ground water in state.
- iii. Significance of hydrological parameters.
- iv. Rain water harvesting.
- v. Roof top rain water harvesting.
- vi. Methods of ground water recharging.
- vii. Precaution in ground water recharging.
- viii. Laws and regulation.

[DCE-42P] Building const. &Concrete TechnologyLab

- (i) Layout of a building.
- (ii) To construct brick bonds (English and Flemish bonds) in one, one and half and two brick thick
(a) walls. L, T and cross junction. (b) Columns
- (iii) Visit to construction site for showing the following item of works and to write specific report about the works seen.
(a) Timbering of excavated Trenching
(b) Construction of Masonry Walls
(c) Flooring: Laying of flooring on an already prepared lime concrete base.
(d) Plastering and Pointing of wall
(e) Finishing of wall surface by Lime, Distemper, Snowcem, etc. and calculation of material in 100 Sqm. wall area
(f) Use of Special type of shuttering/crains/heavy machines in construction work.

CONCRETE TECHNOLOGY LAB

- (i) To determine flakiness index and elongation index of coarse aggregate (ISI:2386-pt.1-1963)
- (ii) Field method to determine fine silt in aggregate.
- (iii) Determination of specific gravity and water absorption of aggregates (IS:2386 Part-III-1963) (for aggregates 40mm to 10mm)
- (iv) Determination of bulk density and voids of aggregates (IS:2386-Part-III-1963)
- (v) Determination of surface moisture in fine aggregate by displacement method (IS:2383-Part-III-1963)
- (vi) To determine necessary adjustment for bulking of fine aggregate by field method (IS:2383-Part-III-1983).
- (vii) Test for workability (slump test);
(a) To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/cement ratio on slump.
(b) To test cube strength of concrete with varying water cement ratio.
- (viii) Compacting factor test for workability (IS:1199 1959)
- (ix) Workability of concrete by Vee-Bee consistometer.
- (x) Fineness modulus of sand.

[DCE-43] CONCRETE TECHNOLOGY

1. Introduction

Definition of concrete. Brief introduction to properties of concrete. Advantages of concrete. Uses of concrete in comparison to other building materials.

2 Ingredients of Concrete:

(i) Cement

The chemical ingredients causing changes in properties, situations of use and special precautions in use of the following types of cement: Ordinary Portland cement, rapid hardening cement, low heat cement, high alumina cement, blast furnace slag cement, quick setting, white and coloured cements.

(ii) Aggregates:

Classification of aggregates according to source, size and shape. Characteristics of aggregates particle size and shape, surface texture;specific gravity of aggregate;bulk density, water absorption surface moisture, bulking of sand and

deleterious materials in the aggregate. Grading of Aggregate:-Coarse aggregate, fine aggregate; All in-aggregate; fineness modulus; interpretation of grading charts and combination of two aggregates.

(iii) Water:

Limits on the impurities as per ISI; affect of excessive impurities on concrete, Ascertaining the suitability of water with the help of concrete cube test. Water Cement Ratio Hydration of cement, Effect of various W/C ratios on the physical structure of hydrated cement, water cement ratio law and conditions under which the law is valid; internal moisture, temperature, age, and size of specimen. Definition of cube strength of concrete. Relations between water cement ratio and strength of concrete. Use of CBRI chart.

.4 Workability:

Definition, of workability. Concept of: Internal friction, Segregation, Harshness. Factors affecting workability; water content, shape, size and percentage of fineness passing 300 mic. Measurement of workability slump test, compaction factor test. Recommended slumps for placement in various conditions. Vee-Bee Consistometer.

5. Proportioning for Ordinary Concrete:

Object of mix design, Strength required for various grades as per IS 456, Preliminary test, Works cube test. Proportioning for ordinary mix as prescribed by IS and its interpretation. Adjustment on site for: Bulking, water content, Absorption, Workability Design data for moisture, bulkage, absorption and suitable fine aggregate and coarse aggregate ratio. Difference between ordinary and controlled concrete.

6. Form Work:

- (i) Concept of factors affecting the design of form work (shuttering and staging)
- (ii) Materials used for form work.
- (iii) Sketches of form work for column, beams slabs.
- (iv) Stripping time for form work as per IS
(No problems on the design of form work).
- (v) Removal of formwork.
- (vi) Precautions to be taken before, during and after RCC Construction.
- (vii) Special type of formwork

7. Concrete Operations:

- (i) Storing Cement:
 - (a) Storing of cement in the warehouse.
 - (b) Storing of cement at site.
 - (c) Effect of storage on strength of cement.

Aggregate:

Storing of aggregate on site for maintaining uniformity of moisture and cleanliness.

(ii) Batching:

- (a) Batching of cement.
- (b) Batching of aggregate:

Batching by volume, using gauge box, selection of proper gauge box, Batching by weight-spring balances and by batching machines.

- (c) Measurement of water.

(iii) Mixing

- (a) Hand mixing
- (b) Machine mixing-types of mixer, capacities of mixers, choosing appropriate size of mixers, operation of mixers, mixing of water.
- (c) Maintenance and care of machines.

(iv) Transportation of Concrete:

Transportation with and situations of use of the following- pans, wheel barrows, truck mixers, chutes, belt conveyors, pumps, tower cranes.

(v) Placement of Concrete:

- (a) Prior preparation before placement; when put on natural soil, rocky base, specially prepared sub-base (brick soling and water bound macadam base), hardened concrete base, checking of form work, checking provision for joints.

- (b) Placement of concrete-precautions to be taken.

(vi) Compaction:

- (a) Hand compaction-pavement, narrow and deep members.
- (b) Machine compaction-types of vibrators (internal screed vibrators and form vibrators) Method of handling screed vibrations and immersion vibrations. Suitability of concrete mixes for compaction with vibrators. Selection of suitable vibrators for various situations.

(vii) Finishing concrete slabs-screeding, floating, and trowelling.

(viii) Curing

Object of curing, Method of curing, shading concrete works, covering surfaces with hessian, gunny bags, sprinkling of water, ponding method and membrane curing, steam curing. Recommended duration for curing.

(ix) Jointing Location of construction joints, treatment of construction joint before the concrete is poured, concreting at these joints. Expansion joints in concrete in buildings-their importance and location.

8. Properties of Concrete:

(i) Properties in plastic stage:

(a) Workability

(b) Segregation.

(c) Bleeding.

(ii) Properties of hardened concrete:

(a) Strength. Characteristic strength

(b) Durability

(c) Impermeability.

(d) Dimensional changes.

(iii) Admixture (uses and effect)

(a) Accelerators and retarders.

(b) Air entraining agents.

(c) Water reducing and set controlling agents.

9. Quality Control at site:

Control tests on cement, aggregate water and concrete. Concept of quality control.

10. Hot Weather Concreting: Effect of high temperature on concrete strength with reference to mass concreting, cooling of concrete materials, precautions before, during and after concreting, Use of retarders.

11. Cold Weather Concreting:

Effect of low temperature on concrete strength, Heating of concrete materials. Precaution before, during and after concreting. Use of accelerators.

12. Repair and Maintenance

Method of repairing by grouting new and old concrete work for cracks and holes. Repairs under water.

13. Special types of concrete

General idea of special types of concrete, High strength concrete, fibre reinforced concrete, polymer concrete, ferrocement concrete. readymix concrete.

LABORATORY WORK

[DCE-44] CIVIL ENGINEERING DRAWING-I

DETAILED CONTENTS:

1. Symbols and conventions of materials and fittings used in Civil Engineering works.

2. Symbols and conventions used for electrical fittings.

3. Foundations:

Foundations, details of a spread foundation for an external and internal masonry wall with basement showing necessary damp proofing arrangements.

4. Doors and Windows:

(a) Doors:

Elevation, sectional plan, sectional side elevation of ledged braced and battened door, glazed door and flush door with wire gauge shutter, partly panelled and glazed door, fully panelled door.

(b) Windows:

(i) Elevation, sectional plan, sectional side elevation of fully glazed window and fully panelled window with fan light.

(ii) Elevation, sectional plan and sectional side elevation of a glazed steel window.

5. Roofs

King post & queen post roof trusses with roof covering and support details on wall. Section through RCC & RB flat roof showing details regarding arrangements for water proofing, drainage and heat insulation(details of reinforcement need not be shown)

6. Floors:

(i) Detailed cross-sections of the following types of concrete flooring as per IS:2571-1970.

- (a) Concrete floor finish over ground floor.
- (b) Terrazo floor finish over ground floor.
- (c) Concrete floor finish with structured slab.
- (d) Terrazo floor finish structured slab.
- (e) Terrazo tile floor finish over ground.
- 7. Working drawing of a two roomed building with kitchen and bath having pitched roof.
- 8. Working drawing of a three roomed building from a given line plan and given data.
- 9. Working drawing of a three bed room double storyed flat roofed residential building.
- 10. Stair case
 - a. Details of dog legged stairs (Wooden & RCC).
 - b. Plans of remaining type of stairs.
- 11. a. Details plan and section of an inspection chamber and manhole.
- b. Detailed plan and cross section of a domestic septic and soak pit for 10 users as per IS:2470 Part I.
- 12. Detailed plan and cross section of bathroom, kitchen and W.C. connections.
- 13. Detailed drawing of pipe joints commonly used in water supply and sewerage system.
- 14. Two Room building working drawing with AutoCad-2007 onwards
- 15. Three Room building working drawing with Auto Cad
(Plate No. 14 & 15 should be prepared by Auto Cad Also)

THIRD YEAR

[DCE-51] DESIGN OF REINFORCED CONCRETE STRUCTURE

1. Introduction

2(A) Design based on Working Stress Method Concept of reinforced concrete structures, advantages and disadvantages. Different materials used in RCC with their properties. Load and loading standard as per IS:875 Concept of design of reinforced concrete based on working stresses method and limit state method and their difference.

I. Fundamental of working stress method:

- (i) Assumptions in the theory of simple bending for RCC beams.
- (ii) Flexural strength of a singly reinforced RCC beam. Position of the Neutral Axis. Resisting moment of the section, critical neutral axis, actual neutral axis, concept of balanced, under reinforced and over-reinforced sections.

(iii) Shear Strength :

Permissible shear stresses as per IS:456. Development of stresses in reinforcement, development length and anchoring of bars.

(iv) Bond Strength:

Concept of bond, local and average, permissible bond stresses for plain and Deformed bars as per IS, minimum length of embedment of bars, minimum splice length, actual bond stress in RCC beams and slabs, bond length as per IS: 456.

II. Design of singly reinforced concrete beams as per IS:456 from the given data such as span, load and properties of materials used.

III. Design of lintel.

IV. Design of a cantilever beam and slab.

V. Design of Doubly Reinforced Concrete Beams:

- (i) Doubly reinforced concrete beam and its necessity.
- (ii) Strength of a double reinforced concrete beam section.
- (iii) Method of design: Simple problems only.
- (iv) Reinforcement details of doubly reinforced concrete beam.

VI. Design of RCC Slabs:

- (i) Structural behaviour of slabs under uniformly distributed load (UDL).
- (ii) Types of end supports.
- (iii) Design of one way slab.
- (iv) Design of Two-way slab with the help of tables of IS:456. (Corners not held down)-IS-code method.
- (v) Detailing of reinforcement.

VII. Design of Reinforced Brick-Work

- (i) Plain brick masonry, permissible stresses.
- (ii) Reinforced Brick work and its use in slabs and lintels.
- (iii) Limitations of the use of R.B. Work.
- (iv) General principles of design of reinforced brick lintels and slabs.
- (v) Design of R.B. beams, slab and lintels.

VIII. Design of Tee Beams:

- (i) Structural behaviour of a beam and slab floor laid monolithically.
- (ii) Rules for the design of T-Beams.
- (iii) Economical depth of T-Beams, Strength of T-Beams.
- (iv) Design of singly reinforced Tee-Beams.
- (v) Detailing of reinforcement.

IX. Design of Columns & Column Footings

- (i) Concept of long and short columns.
- (ii) IS specifications for main and lateral reinforcement.
- (iii) Behaviour of RCC column under axial load.
- (iv) Design of Axially loaded short and long columns with hinged ends (circular, square and rectangular as per IS specifications).
- (v) Concept of column footing. Design criteria. Design of square isolated column footings.
- (vi) Detailing of reinforcement.

X. Cantilever Retaining Wall:

Concept of design and function of different parts of a cantilever retaining wall and reinforcement details (No numerical shall be asked in the examination)

XI. Components of Overhead Water Tanks (Dome Shaped): Description of different component e.g. roof, side wall and ring beam, floor slabs, supporting structure and foundations (only reinforcement details be shown and emphasized).

XII. Components of Multi-Storied Framed Structures:

General concept of multistoried framed structures of columns, beam, slabs, and footing, design criteria and method of placing reinforcement in framed structures. Lifts basements (only diagrams to be taught.No numerical shall be asked in the examination)

2(B) Design Based on Limit State Method:

I. Fundamentals of Limit State Method

- i. Theory of limit state method.
- ii. Partial safety factors.
- iii. Flexural strength.
- iv. Shear Strength.
- v. Development Length of bars.

II. Design requirements.

III. Design of the following :

- i. Singly reinforced rectangular beam.
- ii. One way slab (simply supported)

3. Pre-Stressed Concrete

- i. Concept of prestressing.
- ii. Situations where prestressed concrete is used.
- iii. Materials used in prestressed concrete and their specifications as per IS.
- iv. Post-tensioning and pre-tensioning.
- v. Systems of prestressing.
- vi. Freyssinet, Magnol-Blaten and Lee-Mecall systems
- vii. Sketch showing Prestressing arrangement for RCC beam (No numerical problems be asked in the examination)

[DCE-52] TRANSPORTATION ENGINEERING

DETAILED CONTENTS

A : HIGHWAYS

1. Introduction

- (i) Importance of Highway transportation.
- (ii) Functions of IRC.
- (iii) IRC classification of roads.
- (iv) Organisation of state highways department.

2. Road Geometrics:

- (i) Glossary of terms used in geometrics and their importance; Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient.
- (ii) Design and average running speed, stopping and passing sight distances.
- (iii) Curves necessity, horizontal and vertical curves including transition curves and superelevation, Methods of providing superelevation.

(iv) Use of IRC design tables and specifications for finding elements of Road geometrics. Drawing of typical cross-sections in cutting and filling on straight and at a curve.

(v) Under pass & over pass (fly overs and bridges)

3. Highway Surveys and Plans

(i) Designation of a topographic map. Reading the data given on a topographic map.

(ii) Basic considerations governing alignment for a road in plain and hilly area.

(iii) Highway location. Marking of alignment. Importance of various stages viz:

(a) Reconnaissance survey: Conduct reconnaissance and prepare reconnaissance report.

(b) Preliminary survey: Object, organizing, conducting and informations to be collected.

(c) Location survey.

(d) Standards for preparing the highway plans as per Ministry of Transport.

4. Traffic Engineering

(i) Traffic studies , Methods of collection and presentation of volume count data.

(ii) Traffic control devices - Signs, markings and signals, their effectiveness and location, installation of signs, IRC standards.

(iii) Segregation of traffic.

(iv) Types of intersections and choice of each.

(v) Accidents: Types, causes and remedies.

5. Road Materials:

(i) Different types of road materials in use; soil, aggregates binders.

(ii) Function of soil as Highway sub grade.

(iii) C.B.R; Method of finding. CBR value and its significance.

(iv) Testing aggregates: Abrasion test, impact test, crushing strength test, water absorption test and soundness test.

(v) Aggregates : Availability of road aggregates in India, requirements of road aggregates as per IS specifications.

(vi) Binders:Common binders;cement, bitument and Tar, properties as per IS specifications, penetration and viscosity test , procedures and significance. cut back and emulsion and their uses.

6. Road Pavements; Types and Their Construction:

(i) Road pavement : Flexible and rigid pavement,their merits and demerits, typical cross-sections , functions of various components

.(ii) Sub-grade preparation -

Setting out alignment of road, setting out bench marks, control pegs for embankment and cutting, borrow pits, mutams,making profiles of embankment, construction of embankment, compaction, stabilization, preparation of subgrade. methods of checking camber, gradient and alignment as per recommendations of IRC, equipment used for subgrade preparation.

(iii) Flexible pavements: sub base necessity and purpose. stabilized sub base;purpose of stabilization.

Types of Stabilization:

(a) Mechanical stabilization.

(b) Lime stabilization.

(c) Cement stabilization.

(d) Fly ash stabilization.

- (e) Granular sub base
- (iv) Base course:
- (a) Brick soling.
- (b) Stone soling.
- (c) Metalling: water bound macadam and bituminous macadam.

Methods of construction as per Ministry of Shipping and transport (Government of India).

(v) Surfacing:

Types of surfacing;

- (a) Surface dressing.
- (b) (i) Premix carpet.
- (ii) Semi dense carpet (S.D.C)
- (c) Asphalt concrete.
- (d) Grouting.

Methods of constructions as per Ministry of Surface and Transport, Government of India, specifications and quality control; equipment used .

(vi) Rigid pavements

Construction of concrete roads as per IRC specifications: Form laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used.

7. Hill Roads:

(i) Introduction:

Typical cross-sections showing all details of a typical hill road in cut, partly in cut and partly in fill.

(ii) Landslides :

Causes, preventions and control measures

8. Road Drainage:

(i) Necessity of road drainage work, cross drainage works.

(ii) Surface and subsurface drains and storm water drains. Location, spacing and typical details

of side drains, side ditches for surface drainage. Intercepting drains, pipe drains in hill roads, details of drains in cutting embankment, typical cross-sections.

9. Road maintenance:

(i) Common types of road failures-their causes and remedies such as bagie action.

(ii) Maintenance of bituminous roads such as patch work and resurfacing. Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices.

10. Construction Equipment:

Output and use of the following plant and equipments:

- (i) Hot Mix Plant & Mix all battery.
- (ii) Tipper, tractors (wheel and crawler) scraper, bull-dozer, dumpers, showels, grader, roller, dragline.
- (iii) Asphalt mixer and tar boilers.
- (iv) Road pavers.

11. Arboriculture:

Names of trees used in arboriculture, distance of trees from centre of roads and distance between centre to centre of trees, tree guards, maintenance and revenue from trees.

B : RAILWAYS

1. Introduction:

Railways - An important system of communication in India.

2. Permanent Way:

Definition of a permanent way; components of a permanent way, subgrade, ballast, sleepers, rails, fixtures and fastenings. Concept of gauge and different gauges prevalent in India. Suitability of these gauges under different conditions.

3. Track Materials:

(i) RAILS: Function of rails. Different types of rail sections - double headed, bull headed and flat

footed their standard length, weights and comparison. Welded rails - appropriate length of welded rails and advantages of welded rails.

Creep: Its definition, causes, effects and prevention. Wear of rails: its causes and effects.

(ii) SLEEPERS: Function of sleepers; Different types of sleepers: wooden, steel, cast iron (pot type), concrete and prestressed concrete, their sizes, shapes, characteristics and spacing.

(iii) BALLAST: Function, materials used for making ballast stone, brick, slag and cinder, their characteristics.

(iv) FIXTURES AND FASTENINGS:

(a) Connections of rail to rail - Fishplate and fishbolts.

(b) Connection of Rail to sleepers: Sketches of connection between flat footed rails with various types sleepers with details of fixtures and fasteners used.

4. Geometrics for Broad Gauge:

Typical Cross-sections of single and double broad gauge railway tracks in cutting and embankment.

Permanent and temporary land width. Gradients ruling, maximum, minimum for drainage. Gradients in station yards. Curves; Limiting radius of a curve for broad gauge. Transition length to be provided for

railway curves as per railway code. Super-elevation - its necessity and limiting value. Definition of equilibrium cant and cant deficiency, widening of gauge on curves.

5. Points and Crossings:

Necessity and details of arrangement; sketch of a turnout definition of stock rail, tongue rail, check

rail, lead rail, wing rail, point rail, splice rail, stretcher bar, throw of switch, heel of switch, nose of

crossing, angle of crossing, overall length of turnout, facing and trailing points, diamond crossing, crossover, triangle.

6. Track Laying

Preparation of subgrade. Collection of materials setting up of material depot and carrying out initial

operations such as adzing of sleepers, bending of rails and assembling of crossings. Definitions of base and rail head. Transportation by material trollies, rail carriers and material trains. Method of track laying parallel, telescopic and American methods). Or organisation of layout at rail head. Ballasting of the track.

7. Maintenance of Track:

(i) Routine maintenance of formation and side slopes, rails, fixtures and drainage.

(ii) Special maintenance - Replacement of defective sleepers and rails.

(iii) Tools used for the above operations.

NOTE: The study of the subject must be supplemented by a visit to a nearby railway station.

C : BRIDGES

1. INTRODUCTION;

Bridge: Its function and component parts, different parts, difference between a bridge and a culvert.

2. CLASSIFICATION OF BRIDGES:

Their structural elements and suitability:

(i) According to life: Permanent and temporary.

(ii) According to road way level : Deck, through and semi-through.

(iii) According to material: Wooden, steel, RCC, prestressed and masonry.

(iv) According to structural form:

(a) Beam type-RCC,T-Beam,steel girder bridges,plate girder and box girder, trussed bridges N and warren girder bridges.

(b) Arch type-open spandril and filled spandril, barrel and rib type.

(c) Suspension type-Unstiffened sling type, its description with sketches.

(d) According to the position of highest flood level:submersible and non submersible.

3. Site selection and collection of data:

Factors affecting the selection of site for a bridge data to be collected. Bridge span : Economical span and factors affecting it

4. Piers, abutments and wing walls:

Piers:Definition parts.Types:solid (masonry and RCC); Open cylindrical and abutment piers. Definition of the following terms;height of pier,water way (natural and artificial),afflux and clearance. Abutments and wing walls: Definition, types of abutments (straight and tee) abutment with wing walls (straight, splayed, return and curved).

5. Bridge Bearings:

Purpose of bearings: Types of bearings: Fixed plate, sliding plate, deep cast base, rocker and roller bearings, their functions with sketches

6. Temporary Bridges: Necessity, description with sketches of pontoon and boat bridges.

7. Maintenance of Bridges: Inspection of bridges, routine maintenance.

D. Air Port : Basic Element, Runway and Taxi Way.

E. Tunnel :

Introduction, Classification and Construction Method

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[DCE-53] ESTIMATING, COSTING AND VALUATION

DETAILED CONTENTS

A. Buildings

1. Introduction to Estimating:Types of estimates, drawings, (to be attached with these estimates.

Preparation of rough cost estimates).

2. Units of measurement, and units of payment of different items of work.
3. Different methods of taking out quantities: Centre line in-to-in/out-to-put methods.
4. (a) Preparation of a detailed estimate, complete with detailed reports, specifications, abstract of cost and material statement for a small residential building with a flat roof.

(b) Preparation of a detailed estimate with specification, abstract of cost and material statement for pitched roof with steel truss only.

5. **Specifications**

Need, general and detailed specifications, method of writing specifications, Analysis of rates:

(i) Steps in the analysis of rates for any item of work, requirement of material, labour, sundries T.& P. contractors profit.

(ii) Calculation of quantities of materials for:

- (a) Plain cement concrete of different proportions.
- (b) Brick masonry in cement and lime mortar.
- (c) Plastering and pointing with cement mortar in different proportions.
- (d) White washing.

6. Analysis of Rates

Analysis of rates of the following item of work when the data regarding labour, rates of material and rates of labour is given.

- (a) Earth work in excavation and filling with a concept of lead and lift.
- (b) Cement concrete in foundation.
- (c) R.C.C. and R.B. in roof slabs.
- (d) First class burnt brick masonry in cement mortar.
- (e) Cement plaster.
- (f) Cement pointing: Flush, deep pointing.

7. Tender and preparation of tender document.

B. Irrigation

8. Preparation of detailed estimate for a brick lined distributory from a given section.

C. Public health

9. Preparation of detailed estimate for laying a water supply line (C.I. Pipe).

10. Preparation of detailed estimate for sanitary and water supply fittings in a domestic building containing one set of toilets and septic tank.

D. Roads

11. Methods for calculating earth work using:

- (i) Average depth.
- (ii) Average cross sectional area.
- (iii) Graphical method.

12. Calculations of quantities of materials for roads in plains from given drawings.

13. Preparation of detailed estimate using the above quantities.

14. Detailed estimate of a single span slab culvert with return wing walls.
15. Calculation of quantities of different items of work for a masonry retaining wall from given drawings.

E. Valuation

16. Purpose of valuation, principles of valuation.
17. Definition of terms such as depreciation, sinking fund, salvage and scrap value.
18. Valuation of a building property by replacement cost method and rental return method.
19. Method of calculation of standard rent-Concept of capitalized value and years purchase.

[DCE-54] SURVEYING - II

DETAILED CONTENTS

1. Plane Table surveying

- (i) Purpose of plane table surveying. Equipment used in plane table survey (a) Plane table, (b) Alidade (Plain and Telescopic), (c) accessories.
- (ii) Method of plane tabling (a) centering (b) levelling (c) Orientation.
- (iii) Methods of plane table surveying (a) Radiation, (b) Intersection, (c) Traversing (d) Resection.
- (iv) Two point problem.
- (v) Three point problem by
 - (a) Mechanical Method (Tracing paper)
 - (b) Bessel's Graphical Method.
- (c) Trial and error method. Errors in plane table survey and precautions to control them. Testing and adjustment of plane table and alidade.

2. Contouring

Concept of contour: Purpose of contouring; Contour interval and horizontal equivalent; Factors affecting contour interval; characteristics of contour; Methods of contouring direct and indirect, use of stadia measurements in contour survey. Interpolation of contours; Use of contour map; Drawing cross-section from a contour map; Marking alignment of a road, railway and a canal on a contour map; Computation of earthwork and reservoir capacity from a contour map.

3. Theodolite Surveying:

Working of a transit vernier theodolite, Fundamental axes of a theodolite and their relation; Temporary adjustments of a transit theodolite; least count and 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; Traversing by included angles and deflection angle method; traversing by stadia measurement; Theodolite triangulation and plotting at traverse; concept of coordinate and solution of omitted measurements (one side affected); Errors in theodolite survey and precautions taken to minimise them; Limits of precision in theodolite traversing. Principle and working of a micro-optic theodolite. Brief introduction to tacheometry. Principle and working digital theodolite and its practice.

4. Total Station & Auto Level :

Working and application of total station and auto level. Various uses of total station in preparing drawings like drafting of elevation/vertical plane measurement of building.

5. Curves

Simple circular curves:

(i) Need and definition of a simple circular curve; Elements of simple circular curve, Degree of the curve, radius of the curve, tangent length, point of intersection (Apex point), tangent point, length of curve, long chord, deflection angle, apex distance and mid-ordinate. Setting out of simple circular curve:

(a) By linear measurements only:

- Offsets from the tangents.
- Successive bisection of arcs.
- Offsets from the chord produced.

(b) By Tangential angles using a theodolite.

(ii) Transition Curves:

Need (centrifugal force and super elevation) and definition of transition curve; requirements of transition curves; length of transition curves for roads by cubic parabola; calculation of offsets for a transition curve; setting out of a transition curve by tangential offsets only.

(iii) Vertical curves

Setting out of a vertical curve.

6. G.P.S. Surveying: Brief Introduction of G.P.S. surveying for making drawing of Site Plan, Contoured Plan, Digital Mapping, etc. and its practices

[DCE-54P] Field Surveying II Practical's

Ex. (i) (a) Setting the plane table Plate-1.

(b) Marking the North direction.

(c) Plotting a few points by radiation method.

Ex. (ii) (a) Orientation by Plate-1.

- Trough compass - back sighting.

(b) Plotting a few points by intersection method

Ex. (iii) Traversing an area with a plane table (at least five lines) Plate-1.

Ex. (iv) (a) Two point problem. Plate-2.

(b) Three point problem by

- Tracing paper method.
- Bessel's graphical method.
- Trail and error method.

Contouring

. (v) Preparing a contour plan by radial line method by the use of a Tangent, clinometer/Tacheometer. Plate-1.

. (vi) Preparing a contour plan by method of squares. Plate-1. Theodolite

. (vii) Drill for taking out the theodolite mounting on the tripod and placing it back in the box.

. (viii) Reading the vernier and working out the least count, measurement of horizontal angles by repetition and reiteration methods.

(ix) Traversing an area with a theodolite (at least five lines) and Plotting the traverse by calculating Latitude and Departure.

. (x) Measurement of vertical angles by the use of theodolite.

(xi) Measurement of Magnetic bearing of a line.

- (xii) prolonging a line.
- . (xiii) Running a closed traverse with a theodolite (at least five sides) and its plotting. Plate-1 Curves
- (xv) Setting out of a simple circular curve with given data by the following methods: Plate-1.
 - (a) Offsets from main chord.
 - (b) Offsets from the chords produced.
 - (c) One theodolite method.
- . (xvi) Setting out a circular curve with transition length by linear measurements. Plate-1. Total Station & Auto Level
- . (xvii) Demonstration of Total Station & Auto Level G. P. S. Surveying
- . (xviii) Demonstration of G.P.S. Surveying Equipment

[DCE-55] IRRIGATION ENGINEERING

DETAILED CONTENTS

1. Introduction

- 1.1 Definition of irrigation.
- 1.2 Necessity of irrigation
- 1.3 History of development of irrigation in India
- 1.4 Types of irrigation
- 1.5 Sources of irrigation water

2. Rain Fall & Run – Off

- 2.1 Definition of rainfall & run-off, catchment area, Dicken's & Ryve's formulae
- 2.2 Types of rain gauges - Automatic & Non -automatic
- 2.3 Stream gauging.

3. Water Requirement of Crops

- 3.1 Definition of crop season
- 3.2 Duty, Delta and Base Period, their relationship
- 3.3 Gross command area, culturable command area Intensity of Irrigation, Irrigable area
- 3.4 Water requirement of different crops-Kharif and Rabi

4. Lift Irrigation

- 4.1 Types of Wells - shallow & deep well, aquifer types , ground water flow, construction of open wells and tubewells.
- 4.2 Yield of an open/tube well and problems
- 4.4 Methods of lifting water - manual and mechanical devices, use of wind mills.

5. Flow Irrigation

- 5.1 Irrigation canals
- 5.2 Perennial Irrigation
- 5.3 Different Parts of irrigation canals and their functions

- 5.4 Sketches of different canal cross-sections
- 5.5 Classification of canals according to their alignment
- 5.6 Design of irrigation canals - Chezy's formula, Mannings formula, Kennedy's and Lacey's silt theorys and equations, comparison of above two silt theorys. equations, critical velocity ratio.
- 5.7 Use of Garrets and Lacey's charts
- 5.8 Various types of canal lining - Advantages & disadvantages

6. Canal Head Works

- 6.1 Definition, object, general layout, functions of different parts
- 6.2 Difference between Weir and Barrage

7. Regulatory Works

- 7.1 Functions and explanation of terms used
- 7.2 Cross and Head regulators
- 7.3 Falls
- 7.4 Energy dissipaters
- 7.5 Outlets-Different types
- 7.6 Escapes

8. Cross Drainage Works

- 8.1 Functions and necessity of the following types:- Aqueduct, Syphon, Superpassage, Level crossing, inlet and outlet.
- 8.2 Constructional details of the above

9. Dams

- 9.1 Earthen dams-types, causes of failure
- 9.2 Classification into masonry & concrete dams
- 9.3 Labelled cross-section of gravity dam.
- 9.4 Spillways

10. Water Logging and Drainage

- 10.1 Definition, causes and effects, detection, prevention and remedies
- 10.2 Surface and sub-surface drains and their layout.

11. Major Irrigation Projects in India Practice:

Visits to at least one of the Irrigation Projects and write specific report about the same.

- 12. Ground Water Recharge Aim, Method and Advantage.

[DFE-51P] Field Exposure

INDUSTRIAL EXPOSURE AND VISIT

Four Weeks structured and supervised, branch specific, task oriented industrial/field exposure to be organised during summer vacation

The student during the vacation training must undertake training in at least any one of the following.

- 1. Topographical Map :

surey work with the help of level & plan table and prepare the map showing contours.

2. Construction of multistory Framed structure:

The construction of different components of the framed structure foundation (pile, raft etc.) Beams, columns, slab, basement, ducts (lifts & services).

3. Construction of Water Supply & Sewer Line :

The process of laying water supply and sewer pipe lines at a proper gradient and different method of pipe joints.

4. Construction of over Head Tanks ;

construction of different components of over head tank e.g. foundation, columns, beams, ring beams, side walls, circular slab etc.

5. Construction of Irrigation Work ; Construction of Irrigation channel at a proper gradient,

Canal head works, Regulatory work, Falls, cross drainage work, Tube well Open well, wind mill etc.

6. Construction of Dam :

Knowledge of the different works involved in construction of dams e.g. mass concreting, concrete conveyors, tunneling etc.

7. Construction of culverts & bridges :

The construction of piers, abutments, deck beam of bridge construction construction of different components of culvert eg. wing wall abutments curtain wall, slab and arch.

8. Construction of Roads :

The construction of WBM, bituminous, Concrete roads and should know how to provide gradient, camber, super elevation in construction of roads.

9. Construction of Breast Wall & Retaining Wall :

The construction of breast wall & retaining wall of stones in construction of hill roads and provision of weep holes. Be must also understand the R.C.C. retaining wall its components eg. stem, heel and their reinforcement detail & construction.

10. Entrepreneurial and professional Practice:

Student should go for training under the Private Architect/ Civil Engg Consultant / Private Contractor/ Construction Agency and see the Civil Engg. performed by them.

VI Semester

[DCE-61] ENVIRONMENTAL POLLUTION & CONTROL

CONTENTS

1. ECOLOGY OF ENVIRONMENT:-

Elements of environment: Earth, water, air, space and energy. Ecology: Living and non living concept leading to ecology. Ecosystem: Terrestrial, aquatic and marine affect of environmental pollution on ecological balances.

2. POLLUTION AND ITS CLASSIFICATIONS

Definition, classification, air, water, solid waste, thermal, noise and radioactive pollutions. Different parameter of pollution.

3. WATER POLLUTION:-

Sources , transport of pollutants, effect of water pollutants on man, animal , plant and material, various types of pollutants. Mainly discuss various types of wastes from community, general characteristics of domestic & industrial wastes and their affects on environment, disposal methods on land and water, criteria of disposal by dilution. Stream sanitation. Sampling and monitoring instrumentation for water pollution and control.

4. AIR POLLUTION:-

Sources, types of air pollutants, Transport of air pollutants, dispersion by single and multiple sources. Control equipment, filter, electrostatic precipitators, wet scrubbers, fume combustion by incineration. Air pollution control in new and old plants.

5. SOLID WASTE POLLUTION:-

Review of various types of solid waste. sources, components of solid waste, city garbage and industrial solid waste handling and disposal equipment . Method of disposal, salvage and recovery. Volume reduction in solid waste.

6. NOISE POLLUTION:-

Sources, measurement of pollution. Degree of noise. Echoes and their control. Industrial noise, units characteristics occupational injuries due to noise, criteria and standard for occupational injuries due to noise. Means to control noise in industry.

7. THERMAL POLLUTION:-

Various pollutants. Affects on environment, preventive measures.

8. RADIO ACTIVE POLLUTION:

Sources and affect on human, animals, plants and materials, measurement, means to control, preventive measures.

9. LEGISLATION :

Preliminary knowledge of the following Acts and rules made there under-

- The Water (Prevention and Control of Pollution) Act - 1974.
- The Air (Prevention and Control of Pollution) Act - 1981.
- The Environmental Protection (Prevention and Control of Pollution) Act - 1986. Rules notified under EP Act – 1986 Viz.
 - # The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000
 - # The Hazardous Wastes (Management and Handling) Amendment Rules, 2003.
 - # Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.
 - # The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.
 - # Municipal Solid Wastes (Management and Handling) Rules, 2000.
 - # The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

[DCE-62] DESIGN OF STEEL AND MASONRY STRUCTURES

DETAILED CONTENTS

1. Structural Steel and Sections

- (i) Properties of structural steel as per IS:226 and IS:1977.
- (ii) Designation of structural steel sections as per IS Handbook and IS:800

2. Structural Steel Connections

- (i) Riveted connections - types of rivets, permissible stresses in rivets. Types of riveted joints, Failure of riveted joints, Assumptions made in the design of riveted joints. Specification for riveted joints. Design of riveted joints for axially loaded members.

(ii) Welded Connections

Comparison between riveted and welded joints, types of welds, permissible stresses in welds, types of welded connections, strength of welded joint, Design of welded joints for axially loaded members.

3. Tension Members

Forms of common sections. Permissible Stresses in tension for steel. Strength of a tension member. Design of tension members (flats, angles & Tee Sections only). Tension splice and their design.

4. Compression Members

Design of struts and columns as per IS:800. Effective length, slenderness ratio and permissible stresses, simple and built up sections, concept of lacings in built up columns.

5. Beams

Design criteria, allowable stresses, Design of laterally restrained beams including simple built-up sections. Checks for web buckling, web crippling and deflection.

6. Column Bases:- Column bases, design of simple column base

7. Steel Roof Trusses:-

Different types of trusses, Loads on roof trusses. Various combination of loads to cause worst condition. Design of angle and tubular trusses (Tension and compression members), Design of purlins.

8. Masonry and Foundation Structures

Gravity masonry dams, retaining walls and chimneys subjected to lateral pressures. Design of masonry wall foundation (stepped footing)

[DCE-63] CONSTRUCTION MANAGEMENT, ACCOUNTS & ENTREPRENEURSHIP DEVELOPMENT

DETAILED CONTENTS;

PART A : CONSTRUCTION MANAGEMENT

1. Introduction:

- (i) Classification of construction into light, heavy and industrial construction.
- (ii) Stages in construction from conception to realization.
- (iii) The construction team: Owner, engineer and contractors, their functions and interrelationship.
- (iv) Resources for construction industry; men, machines, materials, money and management.
- (v) Main objectives of Civil engineering management.
- (vi) Functions of construction management, planning, organising, staffing, directing, controlling and co-coordinating, meaning of each of these with respect to a construction job.

2. Construction Planning:

- (i) Stages at which planning is done. Pre tender and contract planning by the contractor.
- (ii) Scheduling: Definition, Methods of scheduling: bar charts and CPM, advantages of scheduling. No problem on CPM to be set in the examination.
- (iii) Planning and scheduling of construction jobs by bar charts.
- (iv) Preparation of construction schedule, labour schedule, material schedule, and equipment schedule.
- (v) Limitations of bar charts.

- (vi) Cost-time balancing.

3. Organisation:

- (i) Types of organisation: Line,staff,functional and their characteristics.
- (ii) Principles of organisation; (only meanings of the following and their significance);Span of control ; Delegation of authority and responsibility ; Ultimate authority and responsibility;Unity of command;contact;unity of assignment; job definition; increasing organisation relationship.
- (iii) Motivation and human relationship concept, need and fundamentals.

4. Site Organisation:

- (i) Factors influencing,job layout from site plan.
- (ii) Principle of storing and stacking materials at site.
- (iii) Location of equipment.
- (iv) Preparation of actual job layout for building.
- (v) Organizing labour at site.

5. Construction Labour

- (i) Conditions of construction workers in India, wages paid to workers.
- (ii) Trade unions connected with construction industry and trade Union Act.
- (iii) Labour welfare.
- (iv) Payment of wages Act.Minimum wages Act.
- (v) Workmen compensation Act.
- (vi) Contract Labour Act.

6. Control of Progress:

- (i) Methods of recording progress.
- (ii) Analysis of progress.
- (iii) Taking corrective actions keeping head of office informed.

7. Inspection and Quality Control

- (i) Principles of inspection.
- (ii) Major items in construction job requiring quality control.

8. Accidents and Safety in Construction:

- (i) Accidents - causes.
- (ii) Safety measures for:
 - (a) Excavation work
 - (b) Drilling and blasting.
 - (c) Hot bituminous works.
 - (d) Scaffolding, ladders, form work.
 - (e) Demolitions.
- (iii) Safety campaign.

9. Professional practice.

PART B : ACCOUNTS

10. Introduction:

- (i) Necessity of account.
- (ii) List of reference book on accounts:
 - (a) Civil Services Rules, Vol,I,II and III
 - (b) PWD Accounts codes.
 - (c) Manual of orders.
 - (d) Departmental financial rules.
 - (e) State Treasury rules.

11. Organisation

- (i) Establishments in the PWD.
- (ii) Regular establishment:
 - (a) Permanent establishment.
 - (b) Temporary establishment.
- (iii) Work charged establishment.
- (iv) Contingency establishment.

12. Outline of P.W.D. System of Accounts:

- (i) Necessity of a system of accounts.
- (ii) P.W.D. system of accounts.
- (iii) Classification of transactions:
 - (a) Necessity of maintaining the accounts by Head of Accounts:
 - (b) Heads of Account:
 - Major Heads.
 - Minor Heads.
 - Detailed Heads.

(Detailed Heads of Accounts not to be memorised).

13. Cash

- (i) Definition of cash.
- (ii) Precautions in custody of cash.
- (iii) Treasury challan-procedure to fill the prescribed form.
- (iv) Imprest account and temporary advance.
- (v) Definition of imprest and rules for maintaining imprest account. Actual filling of the prescribed form.
- (vi) Definition of temporary advance; Its difference from the imprest account ; maintenance of temporary advance account.

14. Stores:

- (i) What are stores, their necessity and safe custody.
- (ii) Classification of Stores:
 - (a) Stores debit to suspense heads-stock.
 - (b) Stores debit to final heads: Tools and plant.

Road metal

Material charged direct to works.

- (iii) Stock
 - (a) Kind of articles in stock;
 - (b) Sources of stock receipt;
Suppliers. Other departments, divisions and subdivisions. Manufacturers. Works
 - (c) Sub heads of stock.
 - (d) Quantity accounts of stock.

Rules for preparing indent and invoices; preparation of indent in proper form.

Register of stock receipts and issues, procedure for recording entries in proper form. Actual filling of the form.

- (e) Return of monthly transaction of stock and half yearly return of stock.
- (f) Stock taking of stores-general rules.
- (g) Surpluses and shortages of stock-action for rectification of mistakes in stock accounts.
- (h) Losses of stock-reporting the loss, estimates for loss of stock and writing off.
- (iv) Tools and Plants (T&P)
 - (a) Meaning.
 - (b) Classification of T&P
 - Register of T&P receipts and issues-Rules for actual filling of the prescribed form.
 - Statement of receipts and issues of T&P in prescribed form.
 - (c) Sources of receipt of T&P
 - (d) Authority of issue of T&P.
 - (e) Surpluses and shortage of T&P-reconciliation of accounts.
 - (f) Points of difference in accounts of stock and T&P.
 - (g) Disposal of unserviceable articles of T&P.

Preparation of survey report in prescribed form.

- (v) Road Metal:
 - (a) Meaning.
 - (b) Rules for maintaining road metal returns filling up the prescribed form.
 - (c) Method of checking.
 - (d) Shortages and surpluses.
- (vi) Materials charged direct to works:-Necessity, circumstance under which materials are directly charged to work.
 - (a) Material at site Accounts (M.A.S), Rules for actual filling of prescribed form i.e.
 - Detailed statement of materials compared with estimated requirements and
 - Report of the value and verification of unused materials.
 - (b) Disposal of surplus materials at the work site.

- (c) Definition of:
 - Issue rate.
 - Storage rate.
 - Storage charges.
 - Supervision charges
 - Assets and liabilities.
- (viii) Issue of materials to contractors.

15. Works:

- (i) Categories:
 - (a) Original works.
 - (b) Repair works.
- (ii) Classification of works according to cost
 - (a) Major works.
 - (b) Minor works.
 - (c) Petty works.
- (iii) Conditions to be fulfilled before a work can be taken in hand:
 - (a) Administrative approval.
 - (b) Technical sanction.
 - (c) Appropriation of funds.
 - (d) Expenditure sanction (for plan works)
- (iv) Methods of carrying out works:
 - (a) Departmentally through daily labor
 - (b) Through contractors
 - Piece work system - work order
 - Contract system - Agreement.
- (v) Different types of contract:
 - (a) Item rate contract.
 - Labour rate (%age above or below)for various items or for covered areas construction

(Private construction only)

 - Through rate basis (%age above or below)
 - (b) Lump-sum contract.
- (vi) Allotment of works:
 - (a) Concept of quotations and tenders
 - (b) Work order - Rules and Form.
- (vii) Definition of deposit works and Taccavi works.

16. Payment for Works:

- (i) Daily labour:

- (a) Meaning.
- (b) Muster roll.

Rules.

Instruction for maintenance.

Three parts of M.R. - Nominal roll, unpaid wages, detail of work done and filling of prescribed form.

- (c) Daily labour report, filling of prescribed form.
- (d) Casual labour-Rolls Its difference from M.R.
- (e) Mistakes of common occurrence.
- (ii) Payment of work charged establishment preparation of pay bill on prescribed form.
- (iii) Payment to contractors and suppliers:

- (a) Record of measurement.

Measurement book (M.B.)

General Instructions.

Method of payment after measurements are recorded in M.B.

Common mistakes in the use and maintenance of M.B. Student may be directed to record the measurement of different item such as W/w, Distemper, Painting, Glass fitting, Plastering, etc. for maintenance of a building.

- (b) Check measurement Book (C.M.B.) Purpose, administration with regard to its maintenance.
- (c) Standard measurement book (SMB) Purpose and instruction with regard to its maintenance.
- (iv) Different types of payment
- (a) First and final payment.

Running payment. Secured advance. On account payment. Advance payment. Running and final payment.

- (v) Hand receipt.
- (vi) Clause in which the detailed measurements are dispensed with.

17. Miscellaneous

- (i) Duties of Junior Engineer/S.O. and S.D.O.
- (ii) Instructions on transfer of charge.
- (iii) Maintenance of log books of vehicles and machinery.
- (iv) Manufacturers accounts and out turn of machinery
- (v) Dealing with railways-booking of consignment, taking delivery, credit note, demurrage and wharfage charges and damaged consignment.

PART C : ENTREPRENEURSHIP DEVELOPMENT

18. Introduction:

Entrepreneur, entrepreneurship, its meaning & importance. Qualities of an entrepreneur. Entrepreneur Motivation Training.

19. Financing Agencies :

Financial agencies for land, infra structure, machinery, raw material, import of raw material and machinery. Role and function of Govt. department connected with the development of industries/business ventures in the State.

20. Industrial Legislation and taxes:

Industrial and labour laws, production tax, local tax, trade tax, exise duty and income tax.

21. Project Report:

Component of project report - Land, building, electricity, water, equipment and other utilities. Materials, its availability, cost, labour availability and wage rates. Project report preparation, provisional registration and plan of acquiring finance from proper source (financing agencies).

D. INTELLECTUAL PROPERTY RIGHTS :

Introduction to IPR (Patents, Copy Right, Trade Mark), Protection of undisclosed information, Concept and history of patents, Indian and International Patents Acts and Rules, Patentable and Non patentable invention including product versus Process.

[DCE-64] CIVIL ENGINEERING DRAWING-II

DETAILED CONTENTS

PART A : STEEL STRUCTURAL DRAWING

1. Preparation of a working drawing (elevation, plan, details of joints at ridge, eaves and other connections) for a riveted steel roof truss resting on a masonry wall for the given

span, shape of the truss and the design data regarding the size of the members and the connections. Also calculate the quantity of steel for the truss.

2. Tubular Steel Roof Trusses : Types of trusses for different spans. Details of column -truss connection. Simple trusses using tubular sections. North light provision.

3. Steel connections (a,b,c,d) rivetted and (e) welded All unstiffened.

(a) Beam to beam connections (seated and framed)

(b) Beam to column (seated and framed)

(c) Column base connections (slab base & gusseted base)

PART B : R.C.C. STRUCTURES (On Computer by AutoCad a. PUBLIC BUILDING) :Plan elevation & sections of a public building like school.hospital,canteen,community hall, guest house.atleast double storeyed showing details of followingRCC elements:

(i) R.C.C. beam singly reinforced and doubly reinforced giving the size and number of bars, stirrups their size and spacing.

(ii) Details of reinforcement for a RCC square and circular column with isolated square footing.

(iii) Details of reinforcement for a cantilever beam with given data regarding the size of the beam and the reinforcement. Anchorage of reinforcement.

NOTE: Bar bending schedules for each of the three above items will be prepared:

2. Details of reinforcement in plan and section for a simply supported RCC. One way slab with intermediate support and two way slab. Bar bending schedule should be prepared.

3. Details of reinforcement of a two storeyed internal and corner column. In this, the details of reinforcement at the junction with beams must be shown. Details of reinforcement of the junction of a secondary beam with the main beam with the given data

4.i. Sectional details of T-beam showing details of bars

ii. Details of reinforcement for a cantilever retaining wall with the given design data regarding the reinforcement, size and shape of the wall.

iii. Details of reinforcement in a simple circular overhead water tank.

PART C : IRRIGATION ENGINEERING :

(i) a. Typical sections of a channel. Typical cross-section of an unlined and lined channel in cutting, partly cutting and fully in filling.

b. Typical L-section of a distributory.

(ii) Plan and cross-section of tube well with pumphouse.

(iii) Plan, cross-section and L-section of a distributor fall with details of wing wall, pitching, flooring and tubewell.

PART D :

Reading and interpreting Civil Engg. Drawing.

[DCE-65] EARTHQUAKE ENGINEERING

1. Causes of earthquakes and seismic waves, magnitude, intensity and energy release, Basic terminology, Characteristics of earthquakes, Seismic hazard, vulnerability and risk, Seismic Zoning.

2. Earthquakes performance of structures in past earthquakes.

3. Philosophy of earthquake resistant design and concept of ductility, Short and long period structures, Concept of spectrum, Static force calculations.

4. Architectural considerations : Building simplicity, symmetry. Irregularities, Continuity and Uniformity

5. Effect of soils and liquefaction, Remedial measures, Construction of earth structures.

6. Seismic construction of masonry buildings, provisions of IS:4326.

7. Seismic construction of RC buildings detailing, provisions of IS: 13920.

8. Retrofitting of masonry and reinforced concrete buildings.

9. DISASTER MANAGEMENT :

Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State

Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benefit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human

Resource Development and Function, Information dissemination and communication.

[DCE-61P] PROJECT WORK

DETAILED CONTENTS

Preparation of any such project:

(i) Survey and soil investigation, planning, designing preparing working drawings, estimation and scheduling of a work for a small building including writing of Technical Report.

- (ii) Planning a water supply and drainage system for a house. Preparation of working drawings for all the sanitary fittings. Estimating quantity of materials and cost including writing of technical report.
- (iii) Preparation of water supply and drainage scheme for a small colony with all working drawings, estimates and schedule of works including writing of technical report.
- (iv) Given topographical sheet of the area, select alignment of a small length of road connecting two stations. Preparation of detailed drawings (L-section, cross-section and plan). Detailed estimate, schedule of work and writing of technical report.
- (v) Selection of type design for a culvert to be proposed over a riverlet crossing a road. Preparation of working drawings, detailed estimate, schedule of work and writing of technical report.
- (vi) Conducting survey, preparation of drawings, Estimate and writing technical report for the improvement and widening of an existing road.
- (vii) Conducting survey work, preparation of plans, making proposals for improvement, preparation of estimate for existing road including writing of technical report.
- (viii) Conducting survey work, preparation of plan, L-section and cross-section of a small distributor making proposals and preparing detailed estimates for earth work including writing of technical report.
- (ix) Conducting survey work of a depression, making proposals for bund, working out capacity of reservoir and design of irrigation system including writing of technical report.
- (x) Planning of small civil engineering work including designs, drawings, estimates and technical report writing.
- (xi) Other problem within syllabus including survey work, design, drawing, estimate and technical report writing.

[DCE-62P] CIVIL LAB-III (RCC & TRANSPORTATION ENGG.)

PRACTICALS

Transportation Engg. Lab.

List of Experiments

1. Determination of resistance to abrasion of aggregates by Los Angeles Abrasion Testing Machine.
2. Determination of Aggregate impact value by aggregate impact tester.
3. Determination of C.B.R. Value of sub grade soil.
4. Determination of Aggregate crushing value by aggregate crushing test apparatus.
5. Determination of Penetration Value of bitumen.
6. Determination of softening point of bitumen.
7. Determination of ductility of bitumen.
8. Determination of flash and fire point of bitumen. Field Visits of at least 3 of the following (in different fields):
 1. Railway yard and station, points and crossing, rack, communication, control and panel Board
 2. Railway Museum for the development of Railways, Rails Mono Rails, Sleepers-- i. R.D.S.O. Lucknow & Rail Bhawan Delhi
 3. Bridges under construction.
 4. Grade separator.
 5. Factory for construction of prestressed sleepers or other fixtures.
 6. P.W.D. Research Lab at Lucknow/C.B.R.I. Roorkee.
 7. Hume Pipe Factory.

R.C.C. LAB

Preparation of bar bending schedule and to bend the bars accordingly for the following:

- (i) Singly reinforced concrete beam
- (ii) Doubly reinforced concrete beam
- (iii) Reinforced concrete column
- (iv) Reinforced concrete slab
- (v) Introduction of STADD.PRO (Brief) and its application in calculating structure design of basic one room structure.