

**Scheme of Teaching and Examination for  
5 th Semester of 3 Years Diploma in Civil Engineering**

Duration of Semester : **14 Weeks**  
 Student Contact Hours : **36 Hrs**  
 Total Marks : **800**

Effective from : 2017 -18 Session

Sl. No.	Name of Subject	Subject Code	Subject	Teaching Scheme			Examination Scheme					
				L	T	P	Hours of Exam	Full Marks of Subject	Final Exam / committee marks	Internal Assessment	Pass Marks Final / Ext. Exam	Pass Marks in Subjects
1.	Irrigation Engineering	CIV 503	Theory	3	-	-	3	100	80	20	26	40
2.	RCC Design	CIV 504	Theory	3	-	-	3	100	80	20	26	40
3.	Adv Surveying	CIV 505	Theory	3	-	-	3	100	80	20	26	40
4.	Environmental Engineering	CIV506	Theory	3	-	-	3	100	80	20	26	40
5.	Elective I	CIV 507/508/AAA507	Theory	3	-	-	3	100	80	20	26	40
6.	Environmental Engg Lab	CIV509	Practical	-	-	2	4	50	40	10	-	20
7.	Adv. Surveying Lab	CIV 510	Practical	-	-	2	4	50	40	10	-	20
8.	RCC Design Lab	CIV 511	Sessional	-	-	2	-	50	30	20	-	25
9.	Elective-I Lab	CIV 512/513/AAA514	Sessional	-	-	2	-	50	30	20	-	25
10.	In Plant Training	502	sessional	-	-	-	-	50	30	20	-	25
11.	DLS	501	Sessional	-	-	4	-	50	30	20	-	25
<b>Total Hours of Teaching per week :</b>				<b>15</b>		<b>14</b>						

Elective I (Traffic Management -CIV507/ Adv Construction Methodology & Equipments- CIV508/ Disaster Mangt. – AAA507)

Total Marks : Theory : Practical : Sessional :  
 L : Lecture, T : Tutorial P : Practical

Note: 1. Period of Class hours should be of 1 hrs duration as per AICTE norms.  
 2. Remaining Hrs every week has been marked for students for Library and Student Centered Activities.  
 3. Drawing / Graphics / Practical / Sessional examinations will be held at parent institution.  
 4. Board will depute examiner for Practical examination.  
 5. Regarding sessional examination the parent institution will form a three member committee and this committee will examine the sessional records and hold viva of the examinee for 60 % marks allotted to the subject. Marks for remaining 40 % will be provided by the Faculty concerned on the basis of evaluation of each job / work throughout the semester.  
 6. Inplant Traning of 04 weeks duration to be undertaken after 4<sup>th</sup> semester Exam and before start of 5<sup>th</sup> semester classes.

**SUBJECT : Irrigation Engineering**  
**SUBJECT CODE : CIV503**  
**HOURS : 42**  
**FULL MARKS : 80+20=100**

Introduction Definition:

Irrigation and irrigation engineering, advantages of irrigation, ill effects of over irrigation, types of irrigation project (purpose wise and administrative wise), Methods of irrigation [3Hrs]

Hydrology: Definition of rainfall , rain gauge and rain gauge station , types of rain gauges (names only) average annual rain fall and its calculation , definition of run off , factor affecting run off, calculation of run off by run of coefficient, Inglis' formula , Stranges and Binnie's tables and curves. Maximum flood discharge and methods of calculation. Yield and Dependable yield and methods calculation [5 Hrs]

Water Requirement of Crops: Cropping seasons and crop in Jharkhand.

Definition –Crop period base period, Duty & Delta , factors affecting Duty , relation between Duty & Delta and base period, Definition –CCA , GCA, IA, intensity of irrigation time factor, capacity factor. Problems on water requirement and capacity of canal, Assessment of irrigation water. [5 Hrs]

Investigation And Reservoir Planning ,Survey for irrigation project, data collected for irrigation project. area capacity curve, silting of reservoir, rate of silting , factors affecting silting , methods to control, levels and respective storage in reservoir . Fixing control levels.

[5 Hrs]

Dams And Spillways::Types of dams –Earthen dams and Gravity dams (masonry and concrete) Comparison of earthen and gravity dams with respect to foundation, seepage, construction and maintenance,

[3 Hrs]

Earthen Dams –Components and their function, typical cross section seepage through embankment and foundation seepage control though embankment and foundation. Methods of constructions, types of failure of earthen dams and remedial measures.

[4 Hrs]

Gravity Dams Theoretical and practical profile, typical cross section, stability analysis, drainage gallery, joint in gravity dam, high dam and low dam Spillways-Definition, function, location and components. Emergency and services, ogee spillway and bar type spillway, discharge over spillway. Spillway with and without gates

[5Hrs]

Diversion Head Works: Weirs –components parts, layout of diversion head works & its components and their function, canal head regular, silt excluders and slit ejectors. Barrages –components and their function. Difference between weir and barrage. [5 Hrs]

CANALS –classification of canals according to alignment and position in the canal network. Design of most economical canal section. Design of canal section by Lacey & Kennedy method, Canal lining –Definition, purpose, types of canal lining advantages of canal lining properties of good canal lining material. CD. works-different C.D. works, canal falls, escapes, cross regulators and canal outlets.

[7 Hrs]

Suggested books :

Irrigation Engg by S.k Garg  
Irrigation Engg by H.M Raghunath  
Irrigation Enginnering – Dr. B.C. Punamia  
Engg Hydrology by K Subramanium

**Subject : RCC DESIGN**  
**Subject Code- : CIV 504**  
**Full Marks- : 80+20=100**  
**Hours- : 42**

### **RATIONALE**

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise RCC construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials (bars of different diameters). He must be able to read and interpret structural drawings of different elements. This subject thus deals with elementary design principles as per BIS code of practice and their relevant drawings.

**Objective:-**

Students will be able to:

1. Analyze the section by LSM.
2. Select Proper materials and calculate the design values for the materials.
3. Calculate the loads on structural components as per IS 875 (Part-I &II) provisions.
4. Read and interpret structural drawing.
5. Understand the basic principles of design of R.C.C. sections.
6. Use & Correlate the specifications of IS 456-2000: code& SP-16.
7. Draw and appreciate the proper reinforcement detailing of R.C. structural member and their connection using SP-34 & IS 13920.
8. Prepare the detailed drawing of structural elements with key plans and schedule of reinforcement
9. Design singly reinforced, Doubly reinforced and flanged section of beams, simply supported one way & two way slabs, cantilevers slab, axially loaded columns & footings by LSM.

### **DETAILED CONTENTS**

#### **1. GENERAL:**

Reinforced cement concrete-Concept of composite material-Purpose of providing reinforcement materials used in R.C.C and their requirement -different grades of cement and steel- Characteristic strength and grades of concrete-modular ratio, types of loads on structures as per (IS:875).

Analysis, Design & Detailing : Methods of design-working stress method, limit state method – Introduction of IS 456 and SP-16. I.S.

#### **2. INTRODUCTION TO WORKING STRESS METHOD:**

Assumption made in the working stress method-Permissible stresses (IS:456-2000) Flexural members singly reinforced rectangular section-strain and stress distribution due to bending-actual and critical neutral axes-under/over reinforced sections-balanced sections-lever arm-moment of resistance of singly reinforced rectangular sections (simple problems).

#### **3. INTRODUCTION TO LIMIT STATE METHOD:**

Concept-different limit states- Characteristic strength and design strength of materials- Characteristic loads-partial safety factor for loads and material strength limits state of collapse in flexure-assumption -stress strain curves for concrete and steel, stress block-maximum strain in concrete-limiting values of neutral axis for different grades of steel, moment of resistance of singly ,doubly reinforced rectangular sections, numerical problems.

#### **4. ANALYSIS AND DESIGN OF BEAMS FOR FLEXURE BY L.S.M:**

Effective span of cantilever, simply Supported and continuous beam-breadth and depth requirement of beam-control of deflection -minimum and maximum reinforcement, spacing for main

enforcement and side face reinforcement as per IS 456-2000-design bending moments-design of singly and doubly reinforced rectangular beams - cantilever, simply supported beams. Necessity of providing doubly reinforced Section, reinforcement limitations. Analysis of doubly reinforced section, strain diagram, stress diagram, depth of neutral axis, moment of resistance of the section. Simple numerical problems on finding moment of resistance and design of beam sections.

## **5. SHEAR, BOND AND DEVELOPMENT LENGTH (LSM):**

Nominal Shear stress in R.C. Section, design shear strength of concrete, Maximum shear stress, Design of shear reinforcement, Minimum shear reinforcement, forms of shear reinforcement. Bond and types of bond, Bond Stress, check for bond stress, Development length in tension and compression, anchorage value for hooks 90° bend and 45° bend Standard Lapping of bars, check for development length. Simple numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear. Design of shear reinforcement; Minimum shear reinforcement in beams; Determination of Development length required for tension reinforcement of cantilevers beam and slab, check for development length.

Limit, state of collapse in shear -design shear strength of concrete - design strengths vertical/inclined stirrups and bent up bars in shear - principle of shear design - critical sections shear - nominal shear stress - design of vertical stirrups, inclined stirrups and bent up bars rectangular beams using limit state method - simple problems.

## **6. DESIGN OF T- BEAM AND CONTINUOUS BEAMS BY L.S.M:**

General features, advantages, effective width of flange as per IS:456-2000 code provisions. Analysis of singly reinforced T-Beam, strain diagram & stress diagram, depth of neutral axis, moment of resistance of T-beam Section. Design of singly reinforced T-beam -cantilever /simply supported beams -design of continuous beam using B.M coeffts (equal spans & u.d.l only).

## **7. DESIGN OF SLABS BY L.S.M:**

Classification of slabs - Effective spans- Imposed loads on slabs (IS: 875) - strength and stiffness requirements - minimum and maximum permitted size, spacing and area of main and second reinforcement as per IS 456 - 2000 Design of cantilever, simply supported, slabs and sunshades limit state method Design of continuous slabs using B.M. coefficients - check for shear and stiffness - curtailment of tension reinforcement .

Introduction to two way slab - Effective span - thickness of slab for strength and stiffness requirements Middle and edge strips -B.M. coefficients - design B. Ms. - simply supported and restrained slabs - tension and torsion reinforcement requirement - design of two way slabs using B.M. coefficients curtailment of reinforcement - check for stiffness.

## **8. DESIGN OF STAIRCASES BY L.S.M:**

Types of stairs according to geometry and structural behaviour planning a staircase – effective length of stairs - effective breadth of flights - design of cantilever stairs – design steps of doglegged and open well stairs spanning parallel to the flight. (No numerical Problem)

## **9. DESIGN OF COLUMNS AND FOOTINGS BY L.S.M:**

Limit state of collapse in compression - assumptions - limiting strength of short axially loaded compression members effective length of compression members - slenderness limits for columns - classification of column minimum eccentricity for column loads longitudinal and transverse reinforcement as per IS 456 - 2000 . Design of axially loaded short columns with lateral ties/ helical reinforcement.

Types of footings - Footings with uniform thickness and sloped footings - minimum thickness - critical sections minimum reinforcement, distribution of reinforcement , development length anchorage , cover , minimum edge thickness requirements as per IS 456 - 2000 - Design, of isolated footing (square and rectangular) with uniform / varying thickness by limit state method.

## **10. PRE-STRESSED CONCRETE:**

Introduction to prestressed concrete. Externally and internally prestressed member. Advantages and disadvantages of prestressed concrete. Methods of prestressing, pretensioning and

posttensioning. Losses in prestressing. Concept of prestressing – Stress concept, Load balancing concept. (No numerical Problem).

#### **REFERENCE BOOKS:**

1. Jai Krishna and Jain. OP; "Plain and Reinforced Concrete". Vol.1. Roorkee. Nem Chand and Bros.
2. Handoo ,BL: Mahajan. VM and Singla. DR; "Elementary- of RCC Design" New Delhi Satya Prakashan.
3. Mallick. SK: and Gupta, AP; "Reinforced Concrete" New Delhi. Oxford and IBH Publishing Co.
4. Punmia BC; "Reinforced Concrete Structure Vol. I Delhi Standard Publishers Distributors.
5. N. Subramanian " design of Reinforced concrete structure" oxford University Press.
6. A.K Jain" Limit State Methods of design" .

#### **Subject : RCC Design Lab**

#### **Subject Code : CIV511**

1. Analyse the Data for Design.
2. Design component parts of building.
3. Draw proportional Sketches.
4. Draw construction Details.

#### **Sketch book:**

Sketch book consists of approximately ten plates from R.C.C. Design shall include important information of clauses of IS 456-2000 code. Typical sketches of components members/stress distribution & strain distribution diagrams R.C.C. section/detailing of reinforcement in joints/members. Design of R.C.C structural components by LSM.

The students should make detailed simple design and drawing of reinforcement detailing on two full imperial size sheets finished in pencil on *any five* of the following R.C.C. component members of a two storied building with detailing of reinforcement (G+1) at the joints as per requirements & IS 13920

1. One-way simply supported slab.
2. Two-way simply supported slab.
3. Cantilever slab/chajja.
4. T-Beam.
5. Column and column footing.
6. Dog-legged staircase

Total 10 Experiments/Sessionals has to completed by the Students

**Subject : Advance Surveying**  
**Subject Code : CIV505**  
**Full Marks : 80+20=100**  
**Hours : 42**

**Rationale:**

This is an applied technology Course Which is intended to teach Students application off acts, Concepts, Principles, and procedures in surveying. It is also intended to teach students the odolite traversing and use of Modern Surveying equipments. With this knowledge and skill, He will be able to choose appropriate survey depend in gon requirement to carry out survey works for various civil engineering activities

**Aim**

The Students will be able to

- 1) know the Use of Modern Survey equipments
- 2) Selection of base line and stations in Triangulation surveying.
- 3) use of Remote sensing , GPS and GIS in civil Engg .
- 4) Know the use of photogrammetric Camera and Aerial survey.

**Topic/Sub topic**

**ADVANCE SURVEYING**

**1. Curves: 12 hrs**

➤ **Simple Circular Curves:**

Need and definition of a simple circular curve; Elements of simple circular curves- Degree of the curve, radius of curve, tangent length, point of intersection (Apex point, tangent point length of curve, long chord, Deflection angle, Apex distance and Mid-ordinate, Elements of Simple Circular Curves. Setting out of simple circular curve.

- By linear measurements only; -Offsets from the tangents, -Successive bisection of arcs, Offsets from the chord produced.
- By tangential angles using a theodolite  
Obstacles in setting circular curve.

➤ **Compound Curves:**

Elements and Parts of compound curve. Relation between parts of compound curve and methods of setting.

➤ **Reverse Curve:**

Types and elements.

➤ **Vertical curves:**

Types and length of vertical curve, setting out of vertical curve by tangent correction and Chord Gradient.

➤ **Transition Curves:**

Need (centrifugal force and super elevation) 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. Combined curve.

**2. Trigonometrical Leveling: 6 Hrs**

Introduction: Different cases with base accessible and inaccessible for distance and elevation measurement, curvature and refraction corrections, axis signal correction, method of single and reciprocal observations, calculation of R.L's.

**3. Triangulation and geodetic surveying: 6 hrs**

Introduction: Classification of triangulation system, Triangulation figures of system, The strength of figure, Base line measurement, Satellite station: reduction to centre.

**4. Volume measurements: 6 Hrs**

Introduction, different method of volume computation – cross section method, unit area or borrow pit method and contour method, Cross section method – level section, two level section, side hill two level section, three level section and multilevel section; formula for volume computation -volume average end areas, trapezoidal rule, prismoidal rule (simple numerical problems), Volume through transitions – in highway/railway construction, volume from spot level 9 for foundation of underground reservoir, volume from contour plan, salient features of Mass Haul diagram and its applications,

**5. Aerial Survey & Remote Sensing 06 Hrs**

Aerial Survey Introductions, definition, Aerial photograph. No. of photo graphs considering overlap, scale and ground coordinate of vertical photo graph. Displacement due to ground relief. Simple numerical problems,

Remote Sensing – Introduction, Electro-Magnetic Energy , Remote sensing system-Passive system , Active system, Application of remote sensing : mineral location, Land use/Land cover, Natural Hazards and Environmental engineering system.

**6. Modern Surveying Techniques & Equipments 06 Hrs**

Components and Use of one second Micro Optic Theodolite, Digital Theodolite. Features of Electronic Theodolite

Principle and use of Electromagnetic Distance Measurement (E.D.M ).

Components and Use of Auto level , Digital Level & Total Station

Components and Use of G.P.S (Global Positioning System)

Penta Graph and Digital Plannimeter,

GIS: Introduction and Uses

**Subject : Advance Surveying Lab**

**Subject Code : CIV510**

**List of Experiment-**

List of Practicals (Any 10 Practicals may be performed)

1. Study of electronic theodolites, electronic distance meter and total station.
2. EDM traversing and preparation of contour maps.
3. Distance and elevation measurement by stadia tachometer.
4. Setting out simple circular curve by ordinates from long chord.
5. Setting out a circular curve by Rankine's method of tangential angles.
6. Setting out a circular curve by Double Theodolite method.
7. Setting out Compound Curves.
8. Setting out Vertical Curves by tangent correction.
9. Setting out Vertical Curves by chord gradient.
10. Setting out transition curves.
11. Distance and elevation measurement by subtense bar method.

12. Setting out works- Foundation Marking.
13. Determination of the azimuth of a survey line by observation of the sun.
14. Preparation of GPS survey.
15. Setting of On Observation plan.
16. GPS applications in Cadastral Surveys.
17. GPS application in remote sensing and GIS.

Text Books:

Name	Authors	Publisher	Editions
Surveying and Levelling	R. Subramanian	Oxford University Press	
Fundamental of surveying	S.K.Roy	PHI	
Plane surveying	A.M.Chandra	New age international	
Surveying and Levelling vol. II	S. K. Duggal	TATA MCGRAW-Hill	
Surveying and Levelling vol. II & III	Dr. B. C. Punmia	Laxmi Plublication	
Surveying Vol I and II	T P kanetkar		
Advance Surveying	R Agore		
Advance Surveying	N Natrajan		
Remote Sensing			

**Subject : Environmental Engineering**  
**Subject Code : CIV506**  
**Full Marks- : 80+20=100**  
**Hours- : 42**

### **A. Water Supply**

**UNIT I PLANNING FOR WATER SUPPLY SYSTEM** 4 Hrs

Public water supply system -Planning - Objectives -Design period - Population forecasting -Water demand -Sources of water and their characteristics -Surface and Groundwater- Impounding Reservoir Well hydraulics -Development and selection of source - Water quality - Characterization and standards-Impact of climate change.

**UNIT II CONVEYANCE SYSTEM** 4 Hrs

Pipe layout ( Radial and Grid System )and its components ( different types of joints and accessories) capacity design of pump & pipes, materials of pipe.

**UNIT III WATER TREATMENT** 6 Hrs

Treatment plants: Components and Layout, functions, design and drawing of sedimentation tank and filtration tanks, Disinfection. Aeration - Iron and manganese removal, De-fluoridation and demineralization -Water softening - Desalination- Membrane Systems - Recent advances.

**UNIT IV WATER DISTRIBUTION AND SUPPLY TO BUILDINGS** 4 Hrs

Requirements of water distribution -Components -Service reservoirs -Functions and drawings Network design -Economics -Computer applications -Analysis of distribution networks Appurtenances -operation and maintenance -Leak detection, Methods. Principles of design of water supply in buildings -House service connection -Fixtures and fittings -Systems of plumbing and drawings of types of plumbing.

### **B. Sewage Treatment.**

**UNIT I : PLANNING FOR SEWERAGE SYSTEMS** 04 Hrs

Sources of wastewater generation – Effects – Estimation of sanitary sewage flow – Estimation of storm runoff – Factors affecting, Characteristics and composition of sewage (BOD, COD, Oxgen demand and other characteristics) and their significance – Effluent standards – Legislation requirements.

**UNIT II : SEWER DESIGN** 04 Hrs

Sewerage – Hydraulics of flow in sewers – Objectives – Design period - Design of sanitary and storm sewers, Laying, joining & testing of sewers – appurtenances – Pumps – selection of pumps and pipe Drainage -.

**UNIT III : PRIMARY TREATMENT OF SEWAGE** 06 Hrs

Objective – Selection of treatment processes – Principles, Functions, Design and Drawing of Units - Onsite sanitation - Septic tank with dispersion - Grey water harvesting – Primary treatment – Principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – Construction, operation and Maintenance aspects.

**UNIT IV : SECONDARY TREATMENT OF SEWAGE** 06 Hrs

Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Units  
Activated Sludge Process and Trickling filter – Oxidation ditches, Waste Stabilization Ponds –  
Reclamation and Reuse of sewage - sewage recycle in residential complex - Recent Advances in  
Sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants.

**UNIT V : DISPOSAL OF SEWAGE AND SLUDGE MANAGEMENT 04 Hrs**

Standards for Disposal - Methods – dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – Sludge characterization – Thickening – Sludge digestion – Biogas recovery – Sludge Conditioning and Dewatering – disposal – Advances in Sludge Treatment and disposal.

**Subject : Environmental Engineering Lab**  
**Subject Code : CIV509**

**LIST OF EXPERIMENTS:**

1. Determination of Ammonia Nitrogen in wastewater.
2. Coagulation and Precipitation process for treating waste water
3. Determination of suspended, volatile, fixed and settleable solids in wastewater.
4. B.O.D. test
5. C.O.D. test
6. Nitrate in wastewater.
7. Phosphate in wastewater.
8. Determination of Calcium, Potassium and Sodium.
9. Heavy metals determination - Chromium, Lead and Zinc. (Demonstration only)

**TEXTBOOKS:**

1. Garg, S.K., "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2005.
2. Modi, P.N. "Water Supply Engineering", Vol. I Standard Book House, New Delhi, 2005. 3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2005 REFERENCES: 1. Government of India, "Manual on Water Supply and Treatment", CPHEEO, Ministry of Urban Development, New Delhi, 2003 2. Syed R. Qasim and Edward M. Motley Guang Zhu, "Water Works Engineering Planning", Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.

TEXTBOOKS: 1. Garg, S.K., "Environmental Engineering" Vol. II, Khanna Publishers, New Delhi, 2003. 2. Punmia, B.C., Jain, A.K., and Jain. A., "Environmental Engineering", Vol.II, Lakshmi Publications, News letter, 2005.

**REFERENCES:**

1. "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1997.
2. Metcalf & Eddy, "Wastewater Engineering" – Treatment and Reuse, Tata McGraw Hill Company, New Delhi, 2003.
3. Karia G L & Christian R A, "Wastewater Treatment", Prentice Hall of India, New Delhi, 2013.

**Subject : Traffic Management (Elective-I)**  
**Subject Code : CIV507**  
**Full Marks : 80+20=100**  
**Hours : 42**

**UNIT 1. Traffic Surveys ( to obtain traffic data for the organization and management )**

**1. Speed, Journey Time and Delay Surveys:** [4 hours]

- 1.1 Introduction
- 1.2 Use of Speed, Journey Time and Delay Studies
- 1.3 Methods of Measuring Spot Speeds
- 1.4 Direct Timing Procedure for Spot Speed Determination
- 1.5 Enoscope
- 1.6 Pressure Contact Tubes
- 1.7 Short-Base Methods for Determination Spot Speeds
- 1.8 Rader Speed Meters
- 1.9 Photographic Method and Video Camera Method
- 1.10 Method and Measurement of Running Speed and Journey Speed
- 1.11 Moving Observer Method
- 1.12
- 1.13 Registration Number Method
- 1.14 Elevated Observed Method
- 1.15 Presentation of Travel Time and Journey Speed Data
- 1.16 Delay Studies

**2. Vehicle Volume Counts, Classification and Occupancy:** [2 hours]

- 2.1 Need for Vehicle Volume, Classification and Occupancy Counts
- 2.2 Types of Counts
- 2.3 Methods Available for Traffic Counts
- 2.4 Manual Methods
- 2.5 Combination of Manual and Mechanical Method
- 2.6 Automatic Devices
- 2.7 Planning and Programming Traffic Counts
- 2.8 Vehicle Occupancy Surveys

**3. Origin-Destination Survey :** [2 hours]

- 3.1 Need for O.D. Surveys
- 3.2 Preliminaries
- 3.3 Survey Methods
- 3.4 Checking the Accuracy of O.D. Survey Data
- 3.5 Presentation of Results

**4. Parking Survey :** [2 hours]

- 4.1 Need for Parking Surveys
- 4.2 Definition of Common terms
- 4.3 Types of Parking Surveys
- 4.4 Parking Space Inventory
- 4.5 Parking Usage Survey by Patrol
- 4.6 Questionnaire Type Parking Usage Survey
- 4.7 Cordon Count
- 4.8 Photographic Methods

**UNIT 2. Analysis and Interpretations of Traffic Studies**

**1. Statistical methods for traffic engineering :** [2 hours]

- 1.1 Need
- 1.2 Elementary Concepts of Probability
- 1.3 Mean, Standard Deviation and Variance
- 1.4 Poisson and Binomial Distributions
- 1.5 Normal Distribution

## **2. Speed Studies: [2 hours]**

- 2.1 Introduction
- 2.2 Grouping of Spot Speed Data and Tabular Presentation
- 2.3 Histogram and Cumulative Frequency Curves
- 2.4 Arithmetic Mean Standard Deviation
- 2.5 Fitting a Normal Distribution Curves to Observed Speed Data
- 2.6 Accuracy of Sampling
- 2.7 General Trends in Speed Data
- 2.8 Time Mean Speed and Space Mean Speed

## **3. Traffic Forecasting : [2 hours]**

- 3.1 Need for Traffic Forecasting
- 3.2 Limitations of Traffic Forecasting
- 3.3 Type of Traffic
- 3.4 Forecasts Based on Past Trends and Extrapolation
- 3.5 Forecasts and Mathematical Models
- 3.6 Period for Forecasting

## **UNIT 3. Parking :**

[2 hours]

- 3.1 Traffic and Parking Problems
- 3.2 Ill-Effect of Parking
- 3.3 Zoning and Parking Space Requirement Standards
- 3.4 Design Standards for on Street Parking Facilities
- 3.5 Traffic Regulatory Measures for on Street Parking
- 3.6 Off Street Parking Facilities
- 3.7 Peripheral Parking Schemes
- 3.8 Loading and Unloading Facilities
- 3.9 Truck Terminals
- 3.10 Long Distance Bus Terminals

## **UNIT 4. Traffic controls**

### **1. Traffic Signs:**

[2 hours]

- 1.1 Importance of Traffic Signs
- 1.2 Need for International Standardisation
- 1.3 The Situation in India
- 1.4 General Principles of Traffic Signing
- 1.5 Type of Traffic Signs
- 1.6 Danger Signs (Warning Signs or Cautionary Signs)
- 1.7 Prohibitory Signs
- 1.8 Mandatory Signs
- 1.9 Informatory Signs
- 1.10 Indication Signs
- 1.11 Direction Signs, Advance Direction Signs and Place Identification Signs
- 1.12 Overhead Signs
- 1.13 Route Marker Signs
- 1.14 Location, Height and Maintenance of Traffic Signs

### **2. Road Markings :**

[2 hours]

- 1.1 Function

- 1.2 Types of Road Markings
- 1.3 General Principles of Longitudinal Pavement Markings
- 1.4 Material and Colour
- 1.5 Centre Lines
- 1.6 Traffic Lane Lines
- 1.7 No Overtaking Zone Markings
- 1.8 Pavement Edge Lines
- 1.9 Carriageway Width Reduction Transition Markings
- 1.10 Obstruction Approach Markings
- 1.11 Stop Lines
- 1.12 Pedestrian Crossings
- 1.13 Cyclist Crossings
- 1.14 Route Direction Arrows
- 1.15 Word Messages
- 1.16 Markings at Approaches to Intersections
- 1.17 Parking Space Limits
- 1.18 Object Markings

### **3. Traffic Signals:**

[2 hours]

- 1.1 Introduction
- 1.2 Advantages and Disadvantages of Traffic Signals
- 1.3 Signal Indications
- 1.4 Signal Face
- 1.5 Illustration of the Signals
- 1.6 Number and Location of Signals Faces
- 1.7 Amber Period, Red/Amber Period and Intergreen Period
- 1.8 Fixed Time Signals and Vehicle Actuated Signals
- 1.9 Determination of Optimum Cycle Length and Signal Settings for an Intersection with Fixed Time Signals
- 1.10 Warrants for Signals
- 1.11 Co-ordinated Control of Signals
- 1.12 Signal Approach Dimensions
- 1.13 Area Traffic Control
- 1.14 Delay at Signalised Intersection

## **UNIT V : TRAFFIC MANAGEMENT :**

[12 hours]

Introduction, Area Traffic Management System – Traffic System Management (TSM) with IRC standards , Traffic Regulatory Measures-Travel Demand Management (TDM), Direct and Indirect methods – Congestion and parking pricing , All segregation methods, Coordination among different agencies, Intelligent Transport System for traffic management, enforcement and education.

Scope of traffic management measures, Restriction of turning moments, one way streets-advantages and disadvantages, Tidal flow operation, Closing side – streets, its advantages and disadvantages, Exclusive bus lanes

**Subject : Traffic Management Lab (Elective-I)**  
**Subject Code : CIV512**

### **List of Experiments**

1. Draw flow chart of Traffic Engineering organisation in transportation department of city.
2. Carry out **origin & destination** survey for given area.
3. Perform traffic volume study at given intersection.
4. Compute signal frequency (cycle) time by any method from given data.
5. Draw Various traffic sign
6. Draw various type of Road marking.
7. Draw the sketch of given traffic control Aids.
8. Draw the collision and condition diagram.
9. Study & Design of parking for various type of vehicles.

### **TEXTBOOKS:**

- Kadiyali.L.R. "TrafficEngineering andTransportPlanning", KhannaPublishers, Delhi, 2013
- Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management
- Salter. R.I and Hounsell N.B, "Highway Traffic Analysis and design", Macmillan Press Ltd.1996.

### **REFERENCES:**

- Fred L. Mannering, Scott S. Washburn and Walter P.Kilareski, Principles of Highway Engineering and Traffic Analysis, Wiley India Pvt. Ltd., New Delhi, 2011
- Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi, 2010
- SP:43-1994, IRC Specification, "Guidelines on Low-cost Traffic Management Techniques" for Urban Areas, 1994
- John E Tyworth, "Traffic Management Planning, Operations and control", Addison Wesly Publishing Company, 1996
- Hobbs.F.D. "Traffic Planning and Engineering", University of Brimingham, Peragamon Press Ltd, 2005
- Taylor MAP and Young W, "Traffic Analysis – New Technology and New Solutions", Hargreen Publishing Company, 1998.
- Transportation Planning Handbook, Institute of Transportation Engineers, Practice Hall, Englewood Cliffs, 1992.

**SUBJECT : Advance Construction Methodology & Equipment (Elective-I)**  
**SUBJECT CODE : CIV508**  
**HOURS : 42**  
**FULL MARKS : 80+20=100**

**Unit I** [6 Hrs]

1. Fibres And Plastics: Types of fibres, Steel, Carbon, Glass fibres. Use of fibres as construction materials. Properties of fibres. Types of Plastics:- PVC, RPVC, HDPE, FRP, GRP etc. Coloured plastic , sheets. Use of plastic as construction Material.
2. Artificial Timber: Properties and uses of artificial timber. Types of artificial timber available in market, strength of artificial timber.
3. Miscellaneous materials: Properties and uses of acoustics materials, wall claddings, plaster boards, Micro, silica, artificial sand, bonding agents, adhesives etc.

**Unit 2:** [10 Hrs]

Advanced Concreting Methods: Prestressed Concrete, Grades of Concrete and prestressing cables for prestressed concrete. Methods of pre-tensioning and post tensioning. Equipment and accessories for pre-stressing. Precautions during prestressing of members. Under water Concreting: Underwater concreting for bridge piers and bored pile construction. Procedure and equipments required for tremie method. Properties, workability and water cement ratio of the concrete required.

Ready Mix concrete Necessity and use of Ready Mix Concrete. Production and equipments for RMC.

Ready Mix Concrete plant. Conveying of RMC. Transit mixers working and time of transportation. Workability and water cement ratio for RMC.

Strength of RMC.

Tremix Concreting method: Definition, application of vacuum dewatering concreting. Equipments used in tremix concreting. Procedure of vacuum dewatering concreting ( Tremix).

Special Concretes Properties, uses and procedure of Roller compacted concrete.

Properties and uses of High Impact Resisting concrete.

Properties, uses and constituents of Steel fibre reinforced concrete.

Percentage of steel fibres in SFRC. Effect of size, aspect ratio and percentage of steel fibres on strength of concrete.

**Unit 3** [12 Hrs]

Advanced Construction Methods.

1. Formwork: Steel Formwork, H frames, Steel plates, Steel props, Telescopic props, Girders or trestles. Tubular form work. Slip formwork meaning, use of slip formwork. Process of concreting with slip forms.
2. Construction of Multi-storeyed Buildings, Use of lifts, belt conveyors, Pumped concrete, Equipments and machinery required for construction of Multi-storeyed Buildings. Precautions and safety measures.
3. Prefabricated Construction: Meaning of prefabrication and precast. Methods of prefabrication plant prefabrication and site prefabrication. Linear members, rigid frames, roofing and flooring members, R.C. Doors and windows, wall panels, Jointing of structural members.
4. Soil Reinforcing techniques Necessity of soil reinforcing, Use of wire mesh and Geo synthetics. Strengthening of embankments, slope stabilization in cutting and embankments by soil reinforcing techniques.

**Unit 4** [3 Hrs]

Hoisting and Conveying Equipments

1. Hoisting Equipments Principle and working of Tower cranes, Crawler cranes, Truck

mounted cranes, gantry cranes, Mast cranes, Derricks.

2. Conveying Equipments :Working of belt conveyors. Types of belts and conveying mechanism. Capacity and use of dumpers, tractors and trucks.

**Unit 5****[3 Hrs]**

Earth Moving machinery

1. Excavation Equipments Use, Working and output of bulldozers, scrapers, graders, and power JCB, draglines.
2. Compacting Equipments Use of rollers, Roller types Plain rollers, Sheep footed rollers, Vibratory rollers, pneumatic rollers. Rammers use and working.

**Unit 6****[5 hrs]**

1. Concreting Equipments
2. Concrete Mixers Types of concrete mixers. Weigh batching equipments, Equipments for transportation of concrete trollies, lifts. Transit mixers, Concrete vibrator Needle vibrators, Screeed vibrators. Automatic concrete plants layout, process and working.
3. Stone Crushers Types of stone crushers, capacities and working. Equipments for production of artificial sand.

**Unit 7****[3 Hrs]**

1. Miscellaneous Equipments and Equipment management
2. Miscellaneous Equipments. Pile driving equipment, Pile hammers, selection of hammers. Working of hot mix bitumen plant, Bitumen paver. Grouting equipments, Floor polishing machine.
3. Equipment Management Standard equipment, Special equipment, Selection of equipment,

**Subject : Advance Construction Methodology & Equipment Lab**

**Subject Code : CIV513**

List of Experiments

1. Collect specification/properties of at least five advanced materials of construction and write the report on the same.
2. Write report on tremie method of concreting for piles/Bridge piers.
3. Finding effect of size of fibres and aspect ratio (I/d ratio) of steel fibers on the strength of steel fibre reinforce concrete.
4. Finding effect of percentage of steel fibers on the strength of steel fiber reinforce concrete.
5. Writing a report on method of preparation and conveyance of ready mix concrete.
6. Writing a report on working and output of any three earth moving machinery.
7. Observing at site/video/LCD demonstration of bitumen paver and writing report of the process and equipment observed.
8. Preparing a detailed account of types, numbers and drawing of steel formwork required for a two-storied framed structure resistance building.

**Subject : Disaster Management**

**Subject Code- : AAA507**

**Full Marks- : 80+20=100**

**Hours- : 42**

Course Objectives:

Define the scope and objectives of the field of disaster management.

- Introduce concepts and terms of disaster assistance examine tools and methods, and learn some technology appropriate to the field.
- Develop knowledge on various types of disasters, acquire techniques for lessening impact of disaster and be all to involve community in disaster preparedness.
- Apply modern skills and scientific technologies to combat disasters.

**MODULE I** 6 Hrs

Contemporary, Natural & Man-made Disaster: Fundamentals of Disaster, Dimension & typology of Disaster, Phases of Disaster, Social & Political imperatives, Scale of Disaster, Causes of Disaster, and Disaster Cycle.

**MODULE II** 6 Hrs

Agencies in Relief: Organisations dealing with disaster, UNDRO's mandate in Disaster relief and management, Role of UN in emergencies, IDNDR. Risk assessment & Analysis: Estimation of Risk, Problems with risk assessment, Risk perception and communication, instruments and equipments involved, Objectives of assessment, Type of risk.

**MODULE III** 6 Hrs

Common Disasters: Causes, General characteristics, Predictability, Factor contributing to vulnerability, Risk reduction measures, Management measures, Specific preparedness, Plan for Remedial measure: cyclone, flood, drought, earthquake, landslides including arsenic contamination.

**MODULE IV** 6 Hrs

Earthquakes: Causes, Plate tectonic and seismic waves, Magnitude and Intensity of earthquake, Seismic Zones, BIS provisions on earthquake resistant built environment for non-engineered and reinforced concrete buildings. Fundamentals of ductile detailing.

**MODULE V** 6 Hrs

Planning Considerations for mitigation : Study of disaster and effects on settlements, disaster atlas, Intervention into land use plan. Post disaster action, Community rehabilitation, Temporary and permanent basis, Institutional involvement and policy legislation organization

**MODULE VI** 6 Hrs

Capacity building of disaster management teams, Role of Financial Institutions in Mitigation Effort, Group Dynamics, Concept of Team Building, Motivation Theories and Applications, School Awareness and Safety Programmes.

**MODULE VII** 6 Hrs

Remote-sensing and GIS applications in real time disaster monitoring, prevention and rehabilitation, Laser Scanning Applications in Disaster Management, Quick Reconstruction Technologies, Role of Media in Disasters, Management of Epidemics, Forecasting / Management of Casualties.

**Subject : Disaster Management Lab**  
**Subject Code- : AAA514**

List of Experiments

1. Study of Contemporary Disaster
2. Study of Natural Disaster
3. Study of Non-mode Disaster
4. Disaster agencies in relief.
5. Study of common disaster
6. Earthquakes as disaster
7. Capacity building of disaster Management.
8. Post disaster action & rehabilitation
9. GIS application.
10. Role of media in disaster Management.

**Recommended Books: (Disaster Management)**

1. Vinod Kr. Sharma; Disaster Management, IIPA, New Delhi.
2. Robest McNamara; Blundering into Disaster, 1987, Bloomsbury, London.
3. Disaster Prevention and Mitigation, 1984, UNDRO Publication, Geneva.
4. Disaster Response,- A Handbook for Emergencies, Babu Thomas, 1993
5. Disaster Management books of IGNOU

**Subject Title : Development of Life Skills (Common Paper)**

**Subject Code : 502**

**Full Marks : 50**

**Rationale:**

In today's competitive world, the nature of individual and organizations is changing at very rapid speed. In this situation the responsibility of diploma holder is not unique. After completing his course work he has to face the world and seek meaningful employment also. Merely having knowledge is not sufficient these days. He has to show his communicative skill also. As such the individual skills with capability to show his strength and communicate his willingness new skills for further advancement with to impart his ability and acquiring has to be displayed and learned.

This subject will develop the student as an effective individual to grab the available situation and be member of the unseen team in which he may be put in. It will develop the abilities and skills to perform at highest degree of quality as an individual as well as a member of core group or team. Such skills will enhance his capabilities in the field of searching, assimilating information, managing the given task, handling people effectively, solving challenging problems.

**Objectives:** The students will be able to:

1. Develop acumen to face interview.
2. Lead in the group discussion and set goals and targets for others
3. Develop team spirit i.e. concept of working in teams
2. Apply problem solving skills for a given situation
3. Use effective presentation techniques
4. Apply techniques of effective time management
5. Apply task management techniques for given projects
6. Enhance leadership traits
7. Resolve conflict by appropriate method
8. Survive self in today's competitive world
9. Follow moral and ethics
11. Convince people to avoid frustration

**CONTENTS:**

**SOCIAL SKILLS**

1. Social understanding for group discussion, imaginative thinking and develop free ideas.
2. SWOT Analysis – Concept, and know himself in details. Learn how to make use of SWOT.
3. **Inter personal Relation:-** How to effectively counter arguments of others without hurting their feeling Sources of conflict and conflict resolution, Ways to enhance interpersonal dependence and relations.

#### **4. Problem Solving**

##### **I STEPS IN PROBLEM SOLVING,**

- 1) Identify and clarify the problem,
- 2) Information gathering related to problem,
- 3) Evaluate the evidence,
- 4) Consider alternative solutions and their implications,
- 5) Choose and implement the best alternative,
- 6) Review

##### **II Problem solving technique.(any one technique may be considered)**

- 1) Trial and error
- 2) Brain storming
- 3) Lateral thinking

#### **5. Presentation Skills**

Body language --

Dress like the audience, Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,

Voice and language – Volume, Pitch, Inflection, Speed, Pause, Pronunciation, Articulation, Language, Practice of speech. Use of presentation aids, Summarizing the facts

#### **6. Group discussion –**

Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making

#### **7. INTERVIEW TECHNIQUE**

Necessity, Techniques to influence interviews and giving directions, Tips for handling common questions.

#### **8. Working in Teams**

Understand and work within the dynamics of a groups.

Tips to work effectively in teams,

Establish good rapport, interest with others and work effectively with them to meet common objectives,

Tips to provide and accept feedback in a constructive and considerate way , Leadership in teams, Handling frustrations in group.

#### **9. Task Management**

Introduction, Task identification, Task planning ,organizing and execution, Closing the task

**BOOKS:**

<b>Sr. No</b>	<b>Title of the book</b>	<b>Author</b>	<b>Publisher</b>
1	Adams Time management	Marshall Cooks	Viva Books
2	Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India
3	Body Language	Allen Pease	Sudha Publications Pvt.
4	Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
5	Decision making & Problem Solving	by Adair, J	Orient Longman
6	Develop Your Assertiveness	Bishop , Sue	Kogan Page India
7	Make Every Minute Count	Marion E Haynes	Kogan page India
8	Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
9	Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
10	Presentation Skills	Michael Hatton ( Canada – India Project)	ISTE New Delhi
11	Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd
12	Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
13	Time management	Chakravarty, Ajanta	Rupa and Company
14	Working in Teams	Harding ham .A	Orient Longman

**INTERNET ASSISTANCE**

1. <http://www.mindtools.com>
2. <http://www.stress.org>
3. <http://www.ethics.com>
4. <http://www.coopcomm.org/workbook.htm>
5. <http://www.mapfornonprofits.org/>
6. <http://www.learningmeditation.com> <http://bbc.co.uk/learning/courses/>
7. <http://eqi.org/>
8. <http://www.abacon.com/commstudies/interpersonal/indisclosure.html>
9. <http://www.mapnp.org/library/ethics/ethxgde.htm>
10. [http://www.mapnp.org/library/grp\\_cnfl/grp\\_cnfl.htm](http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm)
11. <http://members.aol.com/nonverbal2/diction1.htm>
12. [http://www.thomasarmstron.com/multiple\\_intelligences.htm](http://www.thomasarmstron.com/multiple_intelligences.htm)
13. <http://snow.utoronto.ca/Learn2/modules.html>
14. <http://www.quickmba.com/strategy/swot/>