

**Scheme of Teaching and Examination for**  
**4<sup>th</sup> 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 Mark Subject
1.	Construction Technology	CIV 402	Theory	3	-	-	3	100	80	20	26	40
2.	Geo Technical Engineering	CIV 403	Theory	3	-	-	3	100	80	20	26	40
3.	Hydraulics	CIV 404	Theory	3	-	-	3	100	80	20	26	40
4.	Theory of Structure	CIV 405	Theory	3	1	-	3	100	80	20	26	40
5.	Transportation Engineering	CIV 406	Theory	3	-	-	3	100	80	20	26	40
6.	Construction Technology Lab	CIV 407	Sessional	-	-	2	-	50	30	20		20
7.	Geo Technical Engineering Lab	CIV 408	Practical	-	-	4	-	100	80	20		40
8.	Hydraulics Lab	CIV 409	Practical	-	-	2	-	50	40	10		20
9.	Transportation Lab	CIV 410	Practical	-	-	2	-	50	40	10		20
10.	Professional Practice II	401	Sessional	-	-	4	-	50	30	20		20
<b>Total Hours of Teaching per week :</b>				<b>15</b>	<b>1</b>	<b>14</b>		<b>800</b>				

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 Library and Student Centred 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 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 work throughout the semester.

# Construction Technology

**Subject Code :CIV 402**

**Total Contact hrs.: 42**

**Total marks: 100 (80+20)**

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## **RATIONALE:**

Many diploma holders in civil engineering are expected to supervise construction of building and other structure. To perform the above task, it is essential that students should have knowledge of various components of building like foundations, walls, roofs, staircases, floors etc., and their construction details. Therefore, the subject of construction technology is very important for civil Engineering diploma holders.

## **AIM:**

The aim of the subject construction technology is mostly to impart knowledge of different components of a building and their construction details to the diploma students of civil engineering.

### **1.0 Introduction:**

**(02 hrs)**

- 1.1 Definition of a building, classification of building based on Occupancy
- 1.2 Different parts of a building. Substructure- foundation, plinth. Superstructure- walls, sill, lintel, doors, and window, floor, roof, parapet, beams, columns.
- 1.3 Type of structure- load bearing structure, framed structure, composite structures

### **2.0 Site Investigation:**

**(01 hrs)**

- 2.1 Objectives of site investigation
- 2.2 Site reconnaissance
- 2.3 Site exploration-

### **3.0 Site Lay out and control:**

**(02hrs)**

- 3.1 Site Layout & layout of storage materials
- 3.2 Construction of temporary site structure and provision of temporary services, fencing and hoarding.

### **4.0 Foundations:**

**(04 hrs)**

- 4.1 Concept of foundation and its purpose
- 4.2 Type of foundations- shallow and deep
  - 4.2.1 Shallow foundation-construction details of: spread foundation for walls, thumb rules for depth and width of foundation and thickness of concrete block, stepped foundation, masonry pillars and concrete columns, raft foundation, combined footing
  - 4.2.2 Deep foundation: Pile foundation; their suitability, classification of piles according to function, material and installation of concrete piles (undreamed, bored, compacted)
  - 4.2.3 Construction: Preparing foundation plans, setting out, excavation, timbering and dewatering.

## **5.0 Construction of Superstructure:**

**(10 hrs)**

5.1 Purpose of walls

5.2 Classification of walls – load bearing, non-load bearing walls, retaining

5.3 Classification of walls as per material of construction: brick, stone, reinforce brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls.

5.4 Brick masonry – Definition of term; mortar, bond, facing, backing, hearting, column, pillar, jambs, reveals, soffit, plinth, plinth masonry, header, stretcher, bed of brick, bat, queen closer, king closer, frog and quoin

5.4.1 Bond—meaning and necessity; English and Flemish bond; one and half and two Brick thick walls in English and Flemish Bond. T, X and right angled corner junctions. Thickness for one , one and half and two brick square pillars in English bond

5.4.2 Construction of bricks 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)

5.4.3 Construction, expansion and construction joints; purpose and construction details

5.5 Stone masonry:

5.5.1 Glossary of term – Natural bed, bedding planes, string course, corbel, cornice, block-in-course, grouting, mouldings, pilaster and buttress

5.5.2 Types of stone masonry: Rubble masonry: random and coarsed, Ashlar masonry: Ashlar fine, Ashlar rough, Ashler facing, specification for coarsed rubble masonry, principles to be observed in construction of stone masonry walls.

5.6 Partition walls: construction details, suitability and uses of brick and wooden partition walls

5.7 Mortar – preparation, use, average strength and suitability of cement, lime, lime cement, lime surkhi and mud mortar

5.8 Scaffolding: construction details and suitability of mason's brick layers and tubular scaffolding

5.9 Shoring and under pinning: type and uses

5.10 Safety in construction of low rise and high rise buildings

## **6.0 Door and windows:**

**(04 hrs)**

6.1 Glossary of terms used in doors and windows

6.2 Door – name , uses and sketches of metal doors, laced and battened doors, framed and panelled doors, glazed and panelled doors, flush doors, collapsible doors, rolling steel shutters, side sliding doors, door frames, PVC shutter and metal doors

6.3 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 metal and plastics etc. in place of timber)

## **7.0 Damp Proofing:**

**(02 hrs)**

7.1 Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, damage to aesthetic appearance, damage to heat insulating materials,

7.2 Type of dampness – moisture penetration the building from outside e.g., rainwater, surface water, ground moisture

7.3 Damp proofing materials and Method of damp proofing basement, ground floors plinth and walls, special damp proofing arrangements in bathrooms, WC and kitchen, damp proofing for roofs and window sills

7.4 Plinth protection and aprons

## **8.0 Floors :**

**(04hrs)**

8.1 Ground floors

8.1.1 Type of floor finish – cast-in-situ, concrete flooring (monolithic, bonded) terrazzo tile flooring, cast-in-situ, terrazzo flooring, Timber flooring, description with sketches of the method of construction of the floors and their specification, floor polishing equipment

8.1.2 PVC floor, ceramic floor

## **9.0 Roofs:**

**(04hrs)**

9.1 Type of roofs, concept of flat, pitched, hipped, arched and cell roofs

9.2 Glossary of terms for pitched roofs – batten, eaves, barge, fascia board, gable hip, lap, purlin, rafter, rag bolt, valley, ridge

9.3 Drainage arrangement for pitched roofs

9.4 Drainage arrangement for roofs

## **10.0 Stairs :**

**(04 hrs)**

10.1 Glossary of terms: stair case, winder, landing, stringer, newel, baluster, riser, tread, width of staircase, hand rail, nosing

10.2 Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc.

10.3 Various type of layout – straight flight, dog legged, open well, quarter turn, half turn (newel and geometrical stairs), bifurcated stair, spiral stair.

## **11.0 Surface finishes:**

**(03 hrs)**

11.1 Plastering – classification according to use and finishes like grit finish, rough cast, pebble dashes, plain plaster etc., dubbing, proportion of mortar used for different plaster, preparation of mortar, techniques of plastering and curing

11.2 Pointing – different types of pointing, mortar used and method of pointing

11.3 Painting – preparation and application of paints in wooden, steel and plastered wall surfaces

11.4 White washing, colour washing and distempering, application of cement and plastic paints

11.5 Commonly used water repellent for exterior surface, their names and application

## **12.0 Building maintenance :**

**(02 hrs)**

Causes and types of cracks, identification and repair of cracks. Gunitting and grouting, use of epoxy and crack fills.

## Construction Technology Lab

**Subject Code CIV 407**

### List of Experiments

1. To collect various building materials from building sites to study their properties and uses.
2. To visit Brick Kiln to understand manufacturing process of Bricks and fly ash bricks.
3. To set out foundation plan on ground for load bearing structure by centre line method.
4. To set out / layout foundation plan of a framed structure on ground.
5. To Visit Building construction site to understand various types of foundation.
6. To Understand construction procedure of English and Flemish Bond for Brick masonry.
7. To visit site and check shuttering and centring formworks.
8. To visit site and check reinforcement Detailing
9. To visit Building Construction site to understand plastering & painting process.
10. To visit Building Construction site to understand Plumbing process.
11. To Visit building construction site to understand Water Proofing process.

### REFERENCE BOOKS:

1. "A text book of building construction" – by Gupta, Sushilkumar, Singia, D.R., and Juneja BM; Sadhana, Katsea Publishing House.
2. "A text Book of Building Construction" – by Deshpande, RS and Vartak, GV; Poona, United Book Corporation.
3. "Building Construction" – by Rangwala, SC; Anand, Charotar Book Stall
4. "A Text Book of Building Construction" – by Kulkarni, GJ; Ahmedabad Book Depot
5. "A Text Book of Building Construction" – by Arora, SP and Bindra, SP; New Delhi Dhanpt Rai and sons
6. "A Text Book of Building Construction" – by Sharma, SK and Kaul, BK; Delhi, S Chand and Co.
7. "Building Construction"- by Sushilkumar; Delhi standard Publishers Distributors.

## Geo-Technical Engg.

Subject Code - CIV403

Total marks : 100 (80+20)

Theory : 42

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1. **Overview of geo technical engineering :** (03 hrs)  
Introduction of Soil, soil mechanics, geotechnical engineering, historical development of geo technical engineering, soil as construction material in Civil Engineering structure as foundation, pavement, earth retaining structures.
2. **Properties of soil :-** (08 hrs)  
Soil as three phase system, Physical and Engineering properties of soil. water content, void ratio, porosity, degree of saturation, unit wt. of soil mass, bulk density, dry density, bulk unit wt. dry unit wt., saturated unit wt., submerged unit wt. and methods to determine them  
Particles size distribution, mechanical sieve analysis, as per IS code, particle size distribution curve, effective diameter of soil uniformity coefficient and coefficient of curvature, well graded and uniformly graded soil, IS classification of soil  
Consistency of soil, Atterberg limits – liquid limit, plastic limit, shrinkage limit, plasticity index, and their determination as per IS code.
3. **Shear strength of soil :-** (06 hrs)  
Components of shearing resistance of soil, shear parameters of soil, Mohr Coulomb failure theory, strength envelop, strength equation purely cohesive and cohesion less soil. Determination of shear strength of soil :- Direct, Indirect confined, unconfined compression test and vane shear test.
4. **Bearing capacity & Earth pressure :-** (12 hrs)  
Definition of bearing capacity, ultimate bearing capacity, safe bearing capacity, allowable bearing capacity. Terzaghi' analysis and assumptions, effect of water table on bearing capacity  
Field determination of bearing capacity:- Plate load test standard penetration test, test procedure as per IS 1888 & IS 2131, typical value of bearing capacity from building code IS 1904  
Definition of Earth pressure, active earth pressure, passive earth pressure, coefficient of earth pressure. Rankin's theory and assumptions made for non-cohesive soil, total earth pressure for non-cohesive soil having dry back fill, sub merged back fill and surcharge for horizontal plane surface and examples based on it.
5. **Foundation :** (03 hrs)  
Types of foundation, Shallow, Deep, Pile and Well foundation, problems and remedies regarding different site condition, introduction to machine foundation.
6. **Compaction, consolidation and stabilization :-** (05 hrs)  
Definition and difference between compaction & consolidation, their requirements. Standard proctor test, modified proctor test, Different methods and equipments for field compaction,  
Stabilization Definition necessity methods and mechanism of soil stabilization, California bearing ratio and CBR test and its significance.

## Geo-Technical Engineering Lab

Subject Code CIV 408

### List of Practical (Minimum 10 experiments are to be performed)

1. Determination of grain size distribution of given soil sample by sieve analysis (gradation of fine aggregate, fineness modulus, effective size and uniformity coefficient)
2. Determination of specific gravity of soil (G) by Pycnometer.
3. Determination of moisture content of given soil sample by oven drying method
4. Determination of bulk unit weight dry unit weight of soil in field by core cutter method
5. Determination of bulk unit weight dry unit weight of soil in field by sand replacement method
6. Determination of Liquid limit & Plastic limit of given soil sample.
7. Determination of coefficient of permeability by constant head test
8. Determination of shear strength of soil using direct shear test
9. Determination of shear strength of soil using unconfined compression test.
10. Determination of shear strength of soil using tri-axial shear test.
11. Determination of MDD & OMC by standard proctor test on given soil sample.
12. Determination of CBR value of given soil sample.



# Hydraulics

**Subject Code- CIV 404**

**Total Contact Hours – 42**

**Full Marks – 100 (80+20)**

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## **RATIONALE :**

The subject of Hydraulics deals with behaviour of fluid at rest and in motion. The Civil Engineering Profession is much concerned with subject like water supply, Sanitary Engineering and Irrigation Engineering, which need a sound knowledge of Hydraulics. Therefore, hydraulics is very important. Basic subject for students of civil Engineering.

## **AIM :**

To aim of the subject Hydraulics is to develop basic concepts regarding behaviour of fluid, specially water, at rest in motion.

### **1. Hydrostatics : (08 hrs)**

- 1.1 Properties of fluids, density, specific gravity, surface tension, capillarity, viscosity and their uses.
- 1.2 Pressure and its measurements : Definitions – intensity of pressure, atmospheric pressure, gauge pressure, absolute pressure and vacuum pressure; Relation between atmospheric pressure, absolute pressure and gauge pressure, pressure head, pressure gauges.
- 1.3 Pressure exerted on an immersed surface; Definitions – total pressure, resultant pressure, expression of equation for total pressure and center of pressure for horizontal, vertical and inclined immersed surface.
- 1.4 Equilibrium of floating body, concept of center of buoyancy , meta center, meta centric height, and meta centric radius , determination of meta centric height by experimental and analytical method, types of equilibrium (stable, unstable & neutral).

### **2. Kinematics of fluid flow (09 hrs)**

Types of flow, flow lines and flow numbers. Circulation and vorticity, Equation for angular velocity, Linear velocity and acceleration. Velocity potential and stream function. Condition of rotational flow. Generalised continuity equation.

### **3. Dynamic of fluid flow (09 hrs)**

- 3.1 Types of energy, Bernoulli's principle and different types of energy losses. Concept of



3.2

**3.3** Application of Bernoulli's principle : Pitot tube, venture meter and orifice meter. Vena contracts a, relation between  $C_c$ ,  $C_v$  and  $C_d$ . Discharge measurement through large orifice. Submerged and partially submerged orifice, External cylindrical mouthpiece. Types of notches & wire. Discharge formula for different notch & weir, Effect of end contraction.

**4. Open channel flow :**

**(10 hrs)**

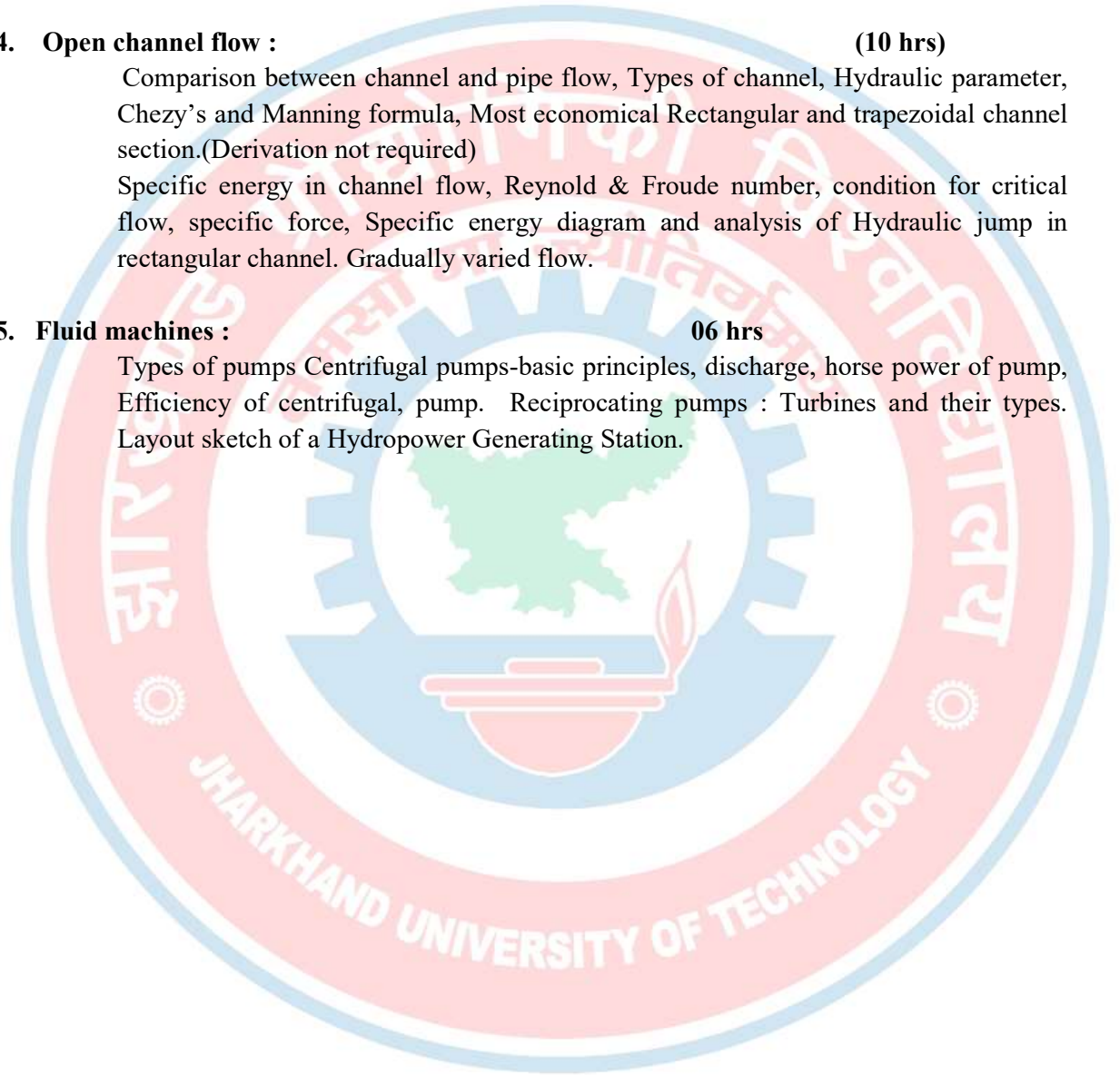
Comparison between channel and pipe flow, Types of channel, Hydraulic parameter, Chezy's and Manning formula, Most economical Rectangular and trapezoidal channel section.(Derivation not required)

Specific energy in channel flow, Reynold & Froude number, condition for critical flow, specific force, Specific energy diagram and analysis of Hydraulic jump in rectangular channel. Gradually varied flow.

**5. Fluid machines :**

**06 hrs**

Types of pumps Centrifugal pumps-basic principles, discharge, horse power of pump, Efficiency of centrifugal, pump. Reciprocating pumps : Turbines and their types. Layout sketch of a Hydropower Generating Station.



# Hydraulics Lab

**Subject Code CIV 409**

## List of Practicals

### Part A (Minimum Six experiments)

1. Measurements of pressure and pressurehead by Pyrometer, U-tube manometer, Measurement of pressure difference by U-tube differential manometer.
2. Verification of Bernoulli's theorem
3. Reynolds experiment to study types of flows in pipe.
4. Determination of Darcy's friction factor for a given pipe
5. Determination of Minor losses in pipes(any two losses)
6. Determination of coefficient of discharge, contraction and velocity of the orifice{Cd, Cc and Cv}
7. Determination of coefficient of discharge for given Rectangular or Triangular Notch.
8. Determination of coefficient of discharge for a given Venturimeter.

### Part B (Minimum Four experiments)

1. Study and use of Manning's or Chezy's equation for open channel flow.
2. Demonstration and use of Pitot tube and current meter.
3. Demonstration of model of Kaplan turbine.
4. Demonstration of model of Pelton wheel.
5. Study of a model of centrifugal pump.
6. Study of a model of reciprocating pump.

### REFERENCE BOOKS :

1. Hydraulics – by Jagdish Lal; Metro Publishing Books Limited  
Hydraulics, Fluid Mechanics and Fluid Machines – by S. Ramamrutham; Dhanpat Rai & Sons, Delhi.
2. Hydraulics – by R.S. Khurmi
3. Hydraulics – by A K Jain
4. Hydraulics –by S.K. Lakhi
5. Hydraulics – by Dr. P.N. Modi &S.M.Seth.
6. Hydraulics and Hydraulic Machinery – V Thanikachalam, Tata McGraw hill Publishing Company Limited.
7. Hydraulics -by R K Bansal

# Theory of Structure

**Subject Code CIV 405**

**Contact Hours -42**

- 1.0 Introduction to indeterminate structure** **2 Hrs**  
Degree of indeterminacy – static and kinematic, force and flexibility Method.
- 2.0 Combined direct and bending stress:** **8 hrs**
- 2.1 Combination of direct stress and flexural/bending stress for eccentric load, limit of eccentricity, core of section, middle third and middle fourth rule.
  - 2.2 Stability of Concrete and masonry dams. Distinction between concrete & masonry dams, check the stability of rectangular and trapezoidal dams with Water face vertical, solve numerical problems. Solve problems to calculate maximum and minimum pressure/stresses at the base of dams, chimney & retaining walls.
- 3.0 Principal Stresses and Principal planes** **6 hrs**
- 3.1 The occurrence and Concept of Normal & Tangential stresses on an oblique plane, Concept of principal stresses and principal planes and their orientation. Formulae with assumptions (no proofs) for major and minor principal stresses and their orientation. (Numerical problems on complex stresses only).
  - 3.2 Use of Mohr's circle – Alternative graphical solution procedure (sketch only) by using Mohr's circle without proof. Supplement the solution of numerical problems by Mohr's circle method.
- 4.0 Framed Structures:** **6 hrs**
- 4.1 Introduction: Statically determinate frame, distinguish between beams and determinate trusses, state the important uses of determinate frames.
  - 4.2 Methods of analysis: Method of joints, method of section.
  - 4.3 Applications: Forces in the members of simple trusses by methods of joint and method of section.
- 5.0 Slope & Deflection of Beams:** **6 hrs**
- 5.1 Concept of slope and deflection, stiffness of beam.
  - 5.2 Relation among bending moment, slope, deflection and radius of curvature, differential equation (no derivation), double integration method to find slope and deflection of simply support and cantilever beam.
  - 5.3 Macaulay's method for slope and deflection, application to simply supported and cantilever beam subjected to concentrated and uniformly distributed load, locating point of maximum deflection and its magnitude.
  - 5.4 Introduction to graphical method of slope and deflection (Mohr's theorem).

**6.0 Analysis of Continuous and Fixed Beam****8 hrs**

- 6.1 Concept of continuous beams & fixed beams. Sketch of deflected shape of two and three-span continuous beams under symmetrical vertical loads by Clapeyron's theorem of three moment method (no theoretical proof of formula). Problems for two/three spans with concentrated or UDL and no sinking of support.
- 6.2 Advantage and disadvantage of fixed beam. Principle of super position.
- 6.3 Determination and Drawing of shear force diagram and BM diagram for continuous beam and fixed beam.

**7.0 Moment distribution method****6 hrs**

- 7.1 Introduction and sign convention.
- 7.2 Carry over factor, stiffness factor, distribution factor.
- 7.3 Application of moment distribution method for various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia up to three spans or two unknown support moment only, SF and BM diagrams (Support at same level)
- 7.4 Application of moment distribution method to single storey single bay Symmetrical portal frame, SF and BM diagrams.

**TOTAL :42 hrs****REFERENCE BOOKS:**

1. Structural Analysis Vol. I & II – S.S Bhavikatti (Vikas publication)
2. Theory of Structure – by S. Ramamruthan
3. Theory of Structure – by R.S.Khurmi & J.K.Gui
4. Theory of Structure – by Dr. B.C Punmia
5. Programmed Text in Strength of Materials – by TTTI, Chandigarh.
6. Analysis of structures, Vol.I – by V.N.Vazirani and M.M.Ratwani
7. Introduction to Mechanics of Solids – by E.P.Popov
8. Elements of Strengths of Material – by S.P.Timoshenko and D.H.Young
9. Strengths of Material – by Surendra Singh.

# TRANSPORTATION ENGINEERING

**Subject Code- CIV 406**

**Total marks : 100 (80+20)**

**Contact Hrs- 42**

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## RATIONALE:

Construction of roads is one of the areas in which diploma holder in Civil Engineering get employment. These diploma holders are responsible for construction and maintenance of highways. Basic concepts of road geometrics, surveys and plans, elements of traffic engineering, road materials, Construction of rigid and flexible pavements, special features of hill roads, roads drainage system and various aspects of maintenance find place in above course.

## AIM:

To develop a thorough knowledge associated with different components of road & highway surveys & plans, construction, maintenance, drainage & related traffic engineering.

## COURSE CONTENTS :

- 1. Overview of transportation Engineering: 1 hrs**
  - 1.1. Role of transportation in the development of nation.
  - 1.2. Modes of transportation system- Roads, Railway, Airways, Waterways, Importance of each mode, Comparison and their relative merits and demerits.
  - 1.3. Functions of Indian Road Congress
  - 1.4. IRC classification of roads.
  
- 2.0 Road Geometrics : 6 hrs**
  - 2.1 Glossary of terms used in geometric and their importance: Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation level, camber and gradient.
  - 2.2 Design and average running speed, stopping and over taking sight distance
  - 2.3 Necessity of curves, horizontal and vertical curves including transition curve and super-elevation, Methods of providing super-elevation and extra widening.
  - 2.4 Use of IRC design tables and specifications for finding elements of road geometric, Drawing of typical cross-section in cutting and filling on straight alignment and at a curve

- 3.2 Function of soil as highway sub grade material.
- 3.3 California Bearing Ratio; methods of finding CBR values in the laboratory and at site and their significance
- 3.4 Testing aggregates; Gradation analysis, elongation and flakiness test, abrasion test, impact test, crushing strength test, water absorption test and soundness test
- 3.5 Binders: Common binders; cements, bitumen and Tar, properties as per IS specifications, ductility test ,penetration and viscosity test of bitumen, procedure and a significance, cut back and emulsion and their uses.

#### **4.0 Road Pavements :**

**6 hrs**

- 4.1 Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components
- 4.2 Flexible pavements: necessity of sub base, stabilized sub base. Preparation of flexible pavement such as earthen road , Water Bound Macadam, granular road & bituminous road .
- 4.3 Surfacing :
  - Type of surfacing
  - a. Surface dressing
  - b. (i) premix carpet
  - (ii) semi dense carpet
  - c. Bituminous concrete
  - d. Grouting

Methods of constructions as per Ministry of Surface Transport (MORTH) , Specifications and quality control as per IRC code.
- 4.4 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.

#### **5.0 Hill Roads:**

**2 hrs**

- 5.1 Introduction:
 

Typical cross-sections showing all details of a typical hill road in cut, partly in cutting and partly in filling
- 5.2 Landslides:
 

Causes prevention and control measures
- 5.3 Breast Walls, retaining walls, different types of bends

#### **6.0 Road Maintenance:**

**1 hrs**

- 6.1 Common types of road failures – their causes and remedies
- 6.2 Maintenance of bituminous and concrete road.

#### **7.0 Traffic studies:**

**4 hrs**

- 7.1 Basic concept of traffic study
- 7.2 Traffic safety and traffic control signal
- 7.3 Road junctions
- 7.4 Traffic island and refuse island; advantages and disadvantages
- 7.5 Origin and destination studies.

#### **8.0 Railway Engineering:**

**8 hrs**

##### **8.1 Alignment and Gauges:**

- Classification of Indian Railway, Zones of Indian Railway.
- Alignment - Factor Government Rail alignment.
- Rail Gauges - Types, Factors affecting selection of gauge.
- Rail track cross-section – standard cross-section of BG and MG single and Double line in

## 8.2 Permanent ways:

Ideal requirement, component parts.

Rail- Function and its types. Rail joint- Requirements, types, Creep of rail.

Sleepers- functions and requirement, types, sleeper density.

Ballast- function and Different types with their properties, relative merits and demerits.

Rail fixtures and Fastenings.

## 8.3 Railway track Geometrics:

Coning of wheels, tilting of rails, Gradient and its Types, super elevation, points and crossing lines, cant deficiency, negative cant, Grade Compensation on Curve.

## 9.0 Bridge engineering:

6 hrs

### 9.1 Site selection and investigation:

Factors affecting selection of site of bridge, bridge alignment.

Collection of design data.

Classification of bridge according to function, material, span, size, alignment, position of HFL.

### 9.2 Component parts of bridge:

Plan

and sectional elevation of bridge showing component parts of, substructure and super structure.

Different terminologies such as effective span, clear span, economical span, waterway, afflux, scour, HFL, freeboard, different types of loadings on bridges.

Foundation- function, types.

Piers- function, requirement, types.

Abutment- function, types.

Wing walls- functions and types.

Approaches- in cutting and embankment.

Bridge flooring- open and solid floors.

## 10.0 Tunnel Engineering:

2 hrs

### 10.1 Definition, Necessity, advantage, disadvantages.

Classification of tunnels.

Shape and size of tunnels.

Tunnel cross-section for highway and railway.

Methods of tunnelling.

Tunnel lining and ventilation.

**TOTAL 42 hrs**

## RECOMMENDED BOOKS:

1. Highway Engineering – by S.K. Khanna & C.E.J. Justo; Nemchand& Bros.
2. Principles and Practices of Highway Engineering – by R.C. Sharma &K.K.Sharma; Wiley Eastern
3. Highway Engineering – by Dr. N.K. Vaswani; Roorkee
4. Highway Material Tests – by S.K. Khanna & C.E.J. Justo; Nemchand& Bros.
5. Highway and Airport Engineering – by Priani, VB; Anand, Charotar Book Stall
6. A text Book on Highway Engineering and Airport – by Sehgal, SB and Bhanot; S Chand and Co., Delhi
7. A Course on Highway Engineering – by Bindra, SP; Dhanpat Rai and Sons, New Delhi
8. Principles and Practice of Highway Engineering – by Sharma, RC and Sharma, SK; Asia Publishing House.
9. Railway engineering by Saxena and Arora.
10. Bridge engineering by S.P. Bindra.
11. Railway Bridge and tunnel engineering by A.K Upadhayay

## Transportation Engg. Lab

**Subject Code -CIV410**

**( Minimum 10 experiments to be performed)**

1. Gradation test (Sieve test) of Coarse Aggregates.
  2. Determination of Flakiness & Elongation of Coarse Aggregates.
  3. Determination of aggregate impact value.
  4. Determination of aggregate abrasion value.
  5. Determination of aggregate crushing value.
  6. Determination of Softening point of Bitumen.
  7. Determination of Flash & Fire point of Bitumen.
  8. Ductility test of Bitumen.
  9. Penetration test on Bitumen.
  10. To find Camber/Super Elevation of road.
  11. Determination of Roughness and level of surface by Benkelman beam method.
  12. Setting out of Simple circular curve by Rankine's method/Long Chord method/ Offset method for a given problem.
- **Laboratory test for highway material:-**
- Determination of Aggregate crushing value
  - Aggregate impact test.
  - Los Angeles abrasion test.
  - Laboratory CBR test.
  - Standard penetration test for bitumen
  - Softening point of bituminous material
  - Ductility test.
  - Marshall Stability test.

### Transportation Engineering-I Laboratory

SL. NO.	ITEM	EXPERIMENT NO.
1	2000 KN compression testing with load gauges	2.2
2	Standard mould for aggregate crushing valve	2.2
3	Aggregate impact tester	2.2
4	Los Angeles abrasion test apparatus	2.3
5	Laboratory CBR test apparatus	2.1
6	Standard penetrometer for bitumen	2.4
7	Ring & ball apparatus for softening point of bituminous material	2.5
8	Ductility test apparatus	2.6
9	Marshall stability test apparatus	13.9
10	Standard accessories	All



## Professional Practices-II

Subject Code:401

### Rationale:

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and their attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussions are planned in a semester so that there will be increased participation of students in learning process.

### Objectives:

Student will be able to:

1. Acquire information from different sources
2. Prepare notes for given topic
3. Present given topic in a seminar
4. Interact with peers to share thoughts
5. Prepare report on industrial visit, expert lecture

Sl. No.	Activity Heads	Activities	Suggested Hrs
1.	Acquire information from different sources	Topic related to the branch and current area of interest i.e. articles in internet on which research or review is undergoing may be decided for the students group. The group may be restricted to maximum 5 students. Literature survey from Internet, print media and nearby practices may be undertaken. Minimum of 10 to 15 papers may be suggested for reading to get an overview and idea of matters.	12
2.	Prepare notes for given topic	Making review or concept to be penned down in form of an article. (the article or review may be of 8 – 10 pages length in digital form of 12 font size in Times New Roman font)	4
3.	Present given topic in a seminar	A seminar or conference or work shop on branch related topic is to be decided and all students in group of 5-6 students may be asked to present their views.	4
4.	Interact with peers to share thoughts	A power point presentation of the	4

		faculty members.	
5.	Prepare a report on industrial visit, expert lecture	A topic on best practices and product / software development may be assigned to the student group. The group may be asked to prepare a survey, come to opinion making and list out the activities to develop the activities with SWOT analysis.	12