

**STATE BOARD OF TECHNICAL EDUCATION, BIHAR**

Scheme of Teaching and Examinations for

**V SEMESTER DIPLOMA IN CIVIL ENGINEERING / CIVIL (RURAL) ENGINEERING**

( Effective from Session 2016-17 Batch )

**THEORY**

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Theory of Structure	1615501	03	03	10	20	70	100	28	40	03
2.	Design of Steel Structure	1615502	03	03	10	20	70	100	28	40	03
3.	Estimating and Costing	1615503	03	04	10	20	70	100	28	40	03
4.	Highway Engineering	1615504	04	03	10	20	70	100	28	40	04
5.	Irrigation Engineering	1615505	03	03	10	20	70	100	28	40	03
		<b>Total :-</b>	<b>16</b>				<b>350</b>	<b>500</b>			

**PRACTICAL**

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Theory of Structure Lab	1615506	02	03	15	35	50	20	01
7.	Design of Steel Structure Lab	1615507	02	03	15	35	50	20	01
8.	Irrigation Engineering Lab	1615508	02	03	15	35	50	20	01
		<b>Total :-</b>	<b>06</b>				<b>150</b>		

**TERM WORK**

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
9.	Professional Practice V (TW)	1625509	04	07	18	25	10	02
10.	Estimating and Costing (TW)	1615510	02	07	18	25	10	01
11.	Building Services and Entrepreneurship Development (TW)	1615511	05	15	35	50	20	02
		<b>Total :-</b>	<b>11</b>			<b>100</b>		
<b>Total Periods per week Each of duration One Hour</b>				<b>33</b>	<b>Total Marks =</b>			<b>24</b>
					<b>750</b>			

# **THEORY OF STRUCTURES**

## **(CIVIL ENGINEERING GROUP)**

Subject Code <b>1615501</b>	Theory						Credits <b>03</b>
	No. of Periods Per Week			Full Marks	:	<b>100</b>	
	L	T	P/S	ESE	:	<b>70</b>	
	<b>03</b>	—	—	<b>TA</b>	:	<b>10</b>	
	—	—	—	<b>CT</b>	:	<b>20</b>	

### **CONTENTS : THEORY**

Name of the Topic		Hrs/week	
<b>Unit -1</b>	<b>Direct And Bending Stresses</b> 1.1 Concept of direct and eccentric loads, eccentricity about one principal axis, nature of stresses, maximum and minimum stresses, resultant stress distribution diagram. 1.2 <b><u>Condition for no tension or zero stress at extreme fiber, limit of eccentricity, core of section for rectangular and circular cross sections.</u></b> 1.3 Columns, pillars and chimneys of uniform section subject to lateral wind pressure, coefficient of wind resistance, stress distribution at bases	<b>10</b>	<b>16</b>
<b>Unit -2</b>	<b>Slope And Deflection</b> 2.1 Concept of slope and deflection, stiffness of beam 2.2 Relation between slope, deflection and radius of curvature, differential equation (no derivation), double integration method to find slope and deflection of simply supported and cantilever beam 2.3 Macaulay's method for slope and deflection,, application to simply supported and cantilever beam subjected to concentrated and uniformly distributed load.	<b>10</b>	<b>14</b>
<b>Unit – 3</b>	<b>Fixed Beam</b> 3.1 Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam. 3.2 Principle of superposition. 3.3 Fixed end moments from first principle for beam subjected to UDL over entire span, central point load, Point load other than mid span. 3.4 Application of standard formulae in finding moments and drawing S.F. and B.M. diagrams for a fixed beam (Derivation need not be asked in the examination)	<b>06</b>	<b>10</b>
<b>Unit – 4</b>	<b>Continuous Beam</b> 4.1 Definition, effect of continuity practical example, nature of moments induced due to continuity, concept of deflected shape 4.2 Clapeyron's theorem of three moment (no derivation) 4.3 Application of theorem maximum up to three spans and two unknown support moment only, Support at same level, spans having same moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. 4.4 Drawing SF and BM diagrams for continuous beams.	<b>08</b>	<b>10</b>

<b>Unit – 5</b>	<b>Moment Distribution Method</b> 5.1 Introduction, sign convention 5.2 Carry over factor, stiffness factor, distribution factor. 5.3 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 and two unknown support moment only, SF and BM diagrams (Supports at same level) 5.4 Application of moment distribution method to single storey single bay symmetrical portal frames, SF and BM diagrams	<b>08</b>	<b>10</b>
<b>Unit – 6</b>	<b>Columns</b> 6.1 Definition, classification of column 6.2 Buckling of axially loaded compression member, Types of end conditions for column, effective length, radius of gyration, slenderness ratio 6.3 Assumptions in the theory of long column Euler's theory, buckling load and Rankin's theory, crippling load, factor of safety, safe load 6.4 Application of Rankin's and Euler theory, designing solid circular or hollow circular sections	<b>06</b>	<b>10</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

<b>Text /Reference Books:-</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Mechanics of structures	S. B. Junnarkar	Charotar Publishing House, Anand
Theory of structures	S. Ramanrutham	Dhanpatrai & Sons, Delhi
Analysis of Structures	V.N.Vazirani & M.M. Ratwani	Khanna Publishers Delhi
Theory of Structure	R.S. Sharma	Foundation Publishing

(I) Beam Colum Joint for Duetile Structure.

(II) Earthquake Part on old Syllabus.

# **DESIGN OF STEEL STRUCTURES**

## **(CIVIL ENGINEERING GROUP)**

Subject Code <b>1615502</b>	Theory						Credits <b>03</b>
	No. of Periods Per Week			Full Marks	:	<b>100</b>	
	L	T	P/S	ESE	:	<b>70</b>	
	<b>03</b>	—	—	<b>TA</b>	:	<b>10</b>	
	—	—	—	<b>CT</b>	:	<b>20</b>	

### **CONTENTS : THEORY**

Name of the Topic		Hrs/week	
<b>Unit -1</b>	<b>Introduction</b> Types of sections used, Grades of steel and strength characteristics; advantages and disadvantages of steel as construction material; Use of steel table and relevant I. S . code; Types of loads on steel structure and its I. S. code specification.	<b>02</b>	<b>08</b>
<b>Unit -2</b>	<b>Connections</b> Riveted connections, Types of rivets and their use, Types of riveted joint and its failure, Strength of riveted joint and efficiency of a riveted joint. Assumptions in theory of riveted joint Design of riveted joint for axially loaded member. Welded connection Introduction, Permissible stress in weld, strength of weld, advantages and disadvantages of welded joint. Types of weld and their symbols. Design of fillet weld and butt weld subjected to axial load.	<b>06</b>	<b>10</b>
<b>Unit - 3</b>	<b>Design of Tension Member</b> TYPES OF SECTIONS USED, PERMISSIBLE STRESSES IN AXIAL TENSION AND GROSS AND NET CROSS- SECTIONAL AREA OF TENSION MEMBER Analysis and Design of tension member with welded and riveted connection. Introduction to Lug Angle and Tension splice.	<b>04</b>	<b>08</b>
<b>Unit - 4</b>	<b>Design of Compression Member</b> Angle struts Types of Sections used, Effective length, Radius of gyration, slenderness ration and its limit, Permissible compressive stresses. Analysis and Design of axially loaded angle struts with welded and riveted connection. Stanchion and Columns types of sections used; simple and built up sections, effective length, Analysis and design of axially loaded column introduction to lacing andbattening (No numerical problem on Lacing and Battening)	<b>06</b>	<b>12</b>
<b>Unit - 5</b>	<b>Steel Roof Truss</b> Types of steel roof truss & its selection criteria Calculation of panel point load for Dead load; Live load and wind load as per I.S. 875-1987 Analysis and Design of steel roof truss. Design of Angle purlin as per I. S. Arrangement of members at supports	<b>06</b>	<b>14</b>

<b>Unit – 6</b>	<b>Beams</b> Different steel sections used; Simple and built-up sections Permissible bending stresses. Design of simple beams, check for shear only. Design of built-up beams (Symmetrical I Section with cover plates only), check for shear only. Introduction to Plate Girder: Various components and their functions. (No numerical Problem on Plate Girder)	<b>04</b>	<b>08</b>
<b>Unit – 7</b>	<b>Column Bases</b> Types of column bases design of slab base & concrete block introduction to gusseted base (no numerical problems on gusseted Base)	<b>04</b>	<b>10</b>
	<b>Total</b>	<b>32</b>	<b>70</b>

<b>Text/ Reference Books:-</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Design of steel structure	S. K. Duggal	Tata Macgraw Hill Publication Company Ltd. New Delhi
Design of steel structure	M. Raghupati	Tata Macgraw Hill publication Company Ltd. New Delhi
Design of steel structure	L. S. Nege	Tata Macgraw Hill publication Company Ltd. New Delhi
Design of steel structure	Ramchandra	Dalpatrai & Sonts publication Company Ltd. New Delhi
Design of Steel Structures	S.S. Bhari katti	I.K. International Publishing House
Design of Steel Structures	Kazimi & Jindal	Prentice hall India, New Delhi.
Design of Steel Structure	S.N. Malik	Foundation Publishing

# **ESTIMATING & COSTING**

## **(CIVIL ENGINEERING GROUP)**

Subject Code <b>1615503</b>	Theory						Credits <b>03</b>
	No. of Periods Per Week			Full Marks	:	<b>100</b>	
	L	T	P/S	ESE	:	<b>70</b>	
	<b>03</b>	—	—	<b>TA</b>	:	<b>10</b>	
	—	—	—	<b>CT</b>	:	<b>20</b>	

### **CONTENTS : THEORY**

Name of the Topic		Hrs/week	Marks
<b>Unit -1</b>	<p>Overview Of Estimating &amp; Costing</p> <p>1.1 Meaning of the terms estimating, costing. Purpose of estimating and costing .</p> <p>1.2 Types of estimate - Approximate and Detailed. Approximate estimate Types- Plinth area rate method, Cubic Content method, Service Unit method, Typical bay method, Approximate Quantity method , Problems on Plinth area rate method &amp; application of Service unit method for selection of service unit for different types of civil Engineering Structures.</p> <p>1.3 Types of detailed estimate. Detailed estimate for new work. Revised estimate. Supplementary estimate. Revised &amp; Supplementary estimate. Maintenance &amp; Repair estimate. Uses of detailed estimate</p>	<b>06</b>	<b>08</b>
<b>Unit -2</b>	<p><b>Detailed Estimate</b></p> <p>2.1 Unit quantity method, Total quantity method, Data required for detailed estimate. Factors to be considered during preparation of detailed estimate, Specification, Quantity availability of material, Location of site, Labour Component.</p> <p>2.2 Steps in preparing detailed estimate. Taking out quantities, squaring, abstracting.</p> <p>2.4 Preparing check list – by adoption of Sequence of execution. drafting Brief Specification of items, contents of measurement Sheet , Abstract sheet , face sheet</p>	<b>04</b>	<b>06</b>
<b>Unit – 3</b>	<p><b>Mode of Measurements.</b></p> <p>3.1 General Rules for fixing units of Measurements for different – items of work as per IS 1200 &amp; As per PWD Hand Book</p> <p>3.2 Desired accuracy in taking measurements of various items of work &amp; rules for deductions as per IS 1200 &amp; P.W.D. handbook.</p>	<b>06</b>	<b>09</b>
<b>Unit – 4</b>	<p>Procedure for Preparing Detailed Estimate</p> <p>4.1 Procedure for taking out quantities for various items of works by P.W.D &amp; IS 1200 for:- a) Load bearing Structure –Long Wall and short wall method , Center line method . b) Framed Structure building. -- - By using thumb rules for reinforcement quantity calculation - By preparing bar bending Schedule</p> <p>4.2 Provisions in detailed estimate for contingencies, work charged establishment, Provisional items, Provisional Sum, Provision for water Supply &amp; Sanitary works, Electrical wiring &amp; installations, centage charges, Tools &amp; Plants, Prime cost, Day work.</p>	<b>14</b>	<b>22</b>

<b>Unit – 5</b>	<b>Rate analysis</b> 5.1 Meaning of term Rate analysis –Factors affecting rate analysis, lead, lift, task work, materials and labour component, Market Rate and labour rate. 5.2 Transportation of Materials, load factor for different materials. Standard lead , extra lead, Transportation Charges , Labour - Categories of labours, labour rates, overheads , contractor's profit, water charges, taking out quantities of materials for different items of works. 5.3 Preparing rate analysis of different items of work 5.4 Standard Schedule of rates, full rates & labour rates. Taking out quantities of work for different Civil Engineering Works Roads, Dam , Canals ,Railway embankments, methods of mean area , mid sectional area, trapezoidal, Prismoidal formula. Calculation of quantity of earth work.	<b>18</b>	<b>25</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

**Text / Reference Books:-**

<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Estimating & costing in Civil Engineering	B.N. Datta	UBS Publishers Distributors Pvt Ltd New Delhi
Estimating & costing, Specification and Valuation in Civil Engineering	M. Chakraborti	M. Chakraborti , Calcutta
Estimating & costing	S.C. Rangwala	Charotar Publication, Anand
Civil Engineering Estimating, Contracts and accounts Vol . I	B.S. Patil	Orient Longman, Mumbai
Estimating & costing	G. S. Birdie	Dhanpat Rai and Sons Delhi
Estimating and Costing	R.S. Majumdar	Foundation Publishing

# **HIGHWAY ENGINEERING**

## **(CIVIL ENGINEERING GROUP)**

Subject Code <b>1615504</b>	Theory						Credits <b>04</b>
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

### **CONTENTS: THEORY**

Name of the Topic		Hrs/week	Marks
<b>Unit -1</b>	<b>Road Engineering :</b> 1.1 Importance of road in India. 1.2 Classification of roads according to Nagpur plan (Location and function), and third road development plan. Traffic and tonnage, 1.3 Classification of urban roads.	<b>03</b>	<b>04</b>
<b>Unit -2</b>	<b>Investigation for Road Project</b> 2.1 Reconnaissance survey, Preliminary survey and Location survey for a road project. 2.2 Detailed survey for cross drainage- L-section and C/S sections. 2.3 Fixing the alignment of road, factors affecting alignment of road. 2.4 Drawings required for road project- Key map, Index map, Preliminary survey plan and detailed location survey plan, L-section and C/S sections cross drainage work, land acquisition plan. 2.5 Survey for availability of construction material, location plan of quarries.	<b>03</b>	<b>04</b>
<b>Unit - 3</b>	<b>Geometric Design Of Highways</b> 3.1 Camber- definition, purpose, types, IRC – specifications. 3.2 Kerbs, road margin, road formation, right of way. 3.3 Design speed- IRC – specifications 3.4 Gradient – definition, types, IRC specification. 3.5 Sight distances– definition, types, IRC specification. 3.6 Curves–Necessity, types– horizontal, vertical and transition curves. 3.7 Widening of roads on curves. 3.8 Super Elevation – definition, formula for calculating super elevation, minimum and maximum values of super elevation, and methods of providing super elevation. 3.9 Sketching of standard C/S of national highway in embankment and cutting. 3.10 Simple problems on geometric design of road.	<b>12</b>	<b>18</b>



<b>Unit – 4</b>	<b>Construction of Roads Pavements and materials</b> 4.1 Types of road materials and Tests – soil, aggregates, bitumen, Cement Concrete. Test on soil sub grade- C.B.R. test, Test on Aggregate – Los Angeles abrasion, impact, and shape test. Tests on bitumen- Penetration, Ductility and Softening point test. 4.2 Pavement – objective of pavement, structure of pavement, function of pavement components, types of pavement. 4.3 Construction of earthen road – general terms used- borrows pits, spoil bank, lead and lift, balancing of earthwork. Construction procedure. 4.4 Soil stabilized roads – necessity, methods of soil stabilization, brief details of mechanical soil stabilization. 4.5 Water bound macadam roads – materials used, size and grading of aggregates and screening, construction procedure including precautions in rolling. 4.6 Construction of bituminous roads. Terms used–bitumen, asphalt, emulsion, cutback, tar, common grades adopted for construction. Types of bituminous surface – prime coat, tack coat, seal coat, Surface dressing – procedure of construction bituminous penetration macadam, and Bitumen/Tar carpets – procedure of construction. 4.7 Cement concrete pavements- Construction procedure and equipments, Construction joints, joint filler, joint sealer.	<b>14</b>	<b>18</b>
<b>Unit – 5</b>	<b>Traffic Engineering</b> 5.1 Traffic volume study, 5.2 Traffic control devices-road signs, marking, Signals, Traffic island. 5.3 Road intersections- intersections at grade and grade separator intersections. 5.4 Road accident. Building code IS:1904 5.5 Definition of active earth pressure and passive earth pressure, structures subjected to earth pressure in the field	<b>06</b>	<b>10</b>
<b>Unit – 6</b>	<b>Hill Roads</b> 6.1 Parts and functions of hill road components, types of curves, Hill road formation. 6.2 Land slides- causes and prevention. 6.3 Structures- drainage structures.	<b>04</b>	<b>06</b>
<b>Unit – 7</b>	<b>Drainage of Roads</b> 7.1 Surface drainage – side gutter, catch water drains, surface drainage. 7.2 Sub-surface drainage –Longitudinal drains and cross drains.	<b>03</b>	<b>05</b>
<b>Unit – 8</b>	<b>Maintenance and Repairs of Roads</b> 8.1 Necessity of maintenance of roads 8.2 Classification of maintenance operation – ordinary, routine and periodic maintenance. 8.3 Maintenance of W.B.M., bituminous and cement concrete roads.	<b>03</b>	<b>05</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

<b>Text/ Reference Books:-</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Highway Engineering	Khanna & Justo	Khanna Publication
Traffic Engineering	L.R. Kadiyali	--
Transportation Engineering	N.L. Arora, S.P. Luthara	I.P.H. New Delhi
Transportation Engineering	Vazarani & Chandola	Khanna Publication
Road, Railway, Bridges	Biridi & Ahuja.	S.B.H.New Delhi
Transportation Engineering	Kamala.	T.M.H. New Delhi
DATA book of P.W. D.	Khanna & Justo	--
Highway Engineering	B.K. Mathur	Foundation Publishing

# **IRRIGATION ENGINEERING**

## **(CIVIL ENGINEERING GROUP)**

Subject Code <b>1615505</b>	Theory						Credits <b>03</b>
	No. of Periods Per Week			Full Marks	:	<b>100</b>	
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	:	<b>70</b>	
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	:	<b>10</b>	
	<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	:	<b>20</b>	

### **CONTENTS : THEORY**

Name of the Topic		Hrs/week	Marks
<b>Unit -1</b>	<b>Introduction</b> 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.	<b>04</b>	<b>04</b>
<b>Unit -2</b>	<b>Hydrology</b> 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 of, factor affecting run off, calculation of run off by run of coefficient, Inglis' formula, Strangers and Binnie's tables and curves. Maximum flood discharge and methods of calculation. Yield and Dependable yield and methods of calculation.	<b>08</b>	<b>06</b>
<b>Unit - 3</b>	<b>Water Requirement Of Crops</b> Cropping seasons and crop in Maharashtra. 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. Modified Penman method. Assessment of irrigation water.	<b>08</b>	<b>08</b>
<b>Unit - 4</b>	<b>Investigation And Reservoir Planning</b> 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.	<b>06</b>	<b>08</b>
<b>Unit - 5</b>	<b>Dams And Spillways</b> 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 Earthen Dams – Components and their function, typical cross section seepage through embankment and foundation seepage control through embankment and foundation. Methods of constructions, types of failure of earthen dams and remedial measures. Gravity Dams Theoretical and practical profile, typical cross section, 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.	<b>14</b>	<b>18</b>
<b>Unit - 6</b>	<b>Bandhara, Precolation Tanks And Lift Irrigation</b> Advantages and disadvantages of bandharairrigation layout and component parts, solid and open bandhara. Percolation Tanks – necessity and importance, selection of site. Layout of lift irrigation scheme. Irrigation department standard design and specification.	<b>04</b>	<b>06</b>

<b>Unit – 7</b>	<b>Diversion Head Works</b> Weirs – components parts, function and types, layout of diversion head works with its components and their function, canal head regulator, silt excluders and slit ejectors. Barrages – components and their function. Difference between weir and barrage irrigation department standard design and specifications.	<b>10</b>	<b>10</b>
<b>Unit – 8</b>	<b>Canals</b> CANALS – classification of canals according to alignment and position in the canal network. Design of most economical canal section. Canal lining – Definition, purpose, types of canal lining advantages of canal lining properties of good canal lining material. C.D. works- different C.D. works, canal falls, escapes, cross regulators and canal outlets.	<b>10</b>	<b>10</b>
	<b>Total</b>	<b>64</b>	<b>70</b>

<b>Text/ Reference Books:-</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Irrigation and hydraulic structure	S. K. Garg	Khanna publisher, New Delhi
Irrigation Engineering	B.C.punmia	Laxmi Publication, Delhi
Irrigation Engineering	Deepak Verma	Foundation Publishing

## **THEORY OF STRUCTURE LAB** **(CIVIL ENGINEERING GROUP)**

<b>Subject Code</b> <b>1615506</b>	<b>Practical</b>						<b>Credits</b> <b>01</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>	
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>50</b>	
	—	—	<b>02</b>	<b>Internal</b>	<b>:</b>	<b>15</b>	
	—	—	—	<b>External</b>	<b>:</b>	<b>35</b>	

### **CONTENTS : PRACTICAL**

#### **LIST OF PRACTICALS - (ANY SIX):-**

1.	To Verify Strain in an externally loaded beam with the help of a strain gauge indicator and to verify theoretically.
2.	To study behavior of different types of Columns: (i) Both ends fixed (ii) One end fixed and other Pinned (iii) Both ends pinned (iv) One end fixed and other free.
3.	To find Euler's buckling load for different types of Columns : (i) Both ends fixed (ii) One end fixed and other pinned. (ii) Both ends pinned (iv) One end fixed and other free.
4.	To Study two hinged arch for the horizontal displacement of the roller end for a given system of loading and to compare the same with those obtained analytically.
5.	Determination of Shear force and loading.
6.	Compression test on metal.
7.	Determination of deflection of beam.
8.	Determination of moment of Inertia of fly wheel.

**DESIGN OF STEEL STRUCTURE LAB**  
**(CIVIL ENGINEERING GROUP)**

Subject Code 1615507	Practical						Credits 01
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

**CONTENTS : PRACTICAL**

***PRACTICAL SHALL CONSISTS OF SKETCH BOOK AND DESIGN REPORT OF STEEL ROOF TRUSS FOR AN INDUSTRIAL BUILDING, TWO FULL IMPERIAL SIZE SHEET SHALL BE USED FOR DRAWINGS.***

**1. Sketch Book:**

Sketch book shall consists of any five plates out of the below mentioned

1. Typical sketches of sections of tension member, determination of net effective cross sectional area of tension member for angle section.
2. Typical sketches of sections of compression member, determination of effective length for different end conditions.
3. Type of trusses for different spans.
4. Riveted and welded connections for axially loaded member.
5. Column section and slab base
6. Important information of clauses of IS800-1984 and IS875 (Part-1,2 & 3)

**2. Design of Steel roof truss:**

The student should draw two full imperial size sheets covering design of steel roof truss any one of the truss fink, fan, pratt, lattice truss for Span from 8 to 16 meter the design shall cover calculations for the dead load, live load, wind load with design of the various elements. The drawing shall include detailing the truss for below mentioned elements.

- a. Architectural drawing
- b. Data for structural design
- c. Key plan at tie level
- d. Detailed layout of steel roof truss.
- e. Details at end support.

**2. Is Codes :**

1. IS 800-1984 Indian Standard code of practice for use of structural steel in general building construction, BIS New Delhi.
2. IS-875 Part-1, 2, & 3- 1987 Indian Standard code of practice for use of structural steel in general building construction, BIS New Delhi.
3. IS hand book No. 1 Properties of structural steel rolled section
4. Steel table.

**IRRIGATION ENGINEERING LAB**  
**(CIVIL ENGINEERING GROUP)**

<b>Subject Code</b> <b>1615508</b>	<b>Practical</b>						<b>Credits</b> <b>01</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>	
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>50</b>	
	—	—	<b>02</b>	<b>Internal</b>	<b>:</b>	<b>15</b>	
	—	—	—	<b>External</b>	<b>:</b>	<b>35</b>	

**CONTENTS: PRACTICAL**

Data should be collected from irrigation engineering department or irrigation project and processed accordingly.

1. Collection of information and prepare list of documents and drawings required for irrigation project.
2. Calculation of yield from given Topo sheet of a catchment area, plotting catchment area, determination of catchment area by planimeter.
3. Canal capacity calculation from a given command area and cropping pattern.
4. Plotting of area capacity curve of a given contour map of irrigation project
5. From a given data fixation of control levels of reservoir.
6. Layout of drainage in earthen dam on A4 size plate
7. Neat labeled sketch of ogee spillway with gate and energy dissipation arrangement.
8. Study of National Water Policy.

**PROFESSIONAL PRACTICES V-TW**  
**(MECH.+CIVIL ENGINEERING GROUP)**

Subject Code 1625509	Term Work						Credits 02
	No. of Periods Per Week			Full Marks	:	25	
	L	T	P/S	Internal	:	07	
	—	—	04	External	:	18	

**CONTENTS : TERM WORK**

Name of the Topic		Hrs/week
<b>Unit -1</b>	<b>Structured industrial visits shall be arranged and report of the same should be submitted by the individual student, to form a part of the term work.</b> Following are the suggested type of Industries/ Fields –(Any three visits) vi) Irrigation project for observing components of dam and canal. vii) Steel structure for study of its details. viii) Residential apartment /public building to study plumbing system. ix) Hot mix plant	<b>18</b>
<b>Unit -2</b>	<b>The Guest Lecture/s from field/industry experts, professionals to be arranged (2 Hrs duration), minimum 2 nos. from the following or alike topics. The brief report to be submitted on the guest lecture by each student as a part of Term work.</b> a) Construction of highway, material of construction, machinery used and manpower requirement . b) To set up a small scale industry. c) Planning and design of irrigation project.	<b>10</b>
<b>Unit - 3</b>	<b>Information Search ,data collection and writing a report on the topic</b> a) Collecting an estimate from P.W.D. b) International Plumbing code and material specifications from market. c) Collecting market rates for material and labour for building items . d) Collecting D.S.R. /C.S.R. from PWD and its use for preparing revise estimate.	<b>14</b>
<b>Unit - 4</b>	The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are - i) Recent trends in civil engineering as a service industry. j) Waterproofing and leakage prevention. k) Troubleshooting in plumbing system. l) Causes of failure of road.	<b>18</b>
<b>Unit - 5</b>	<b>Seminar :</b> Seminar topic should be related to the subjects of fifth semester Each student shall submit a report of 5 to10 pages and deliver a seminar (Presentation time – 10 minutes)	<b>10</b>
<b>Total</b>		<b>70</b>



# **ESTIMATING AND COSTING -TW**

## **(CIVIL ENGINEERING GROUP)**

Subject Code <b>1615510</b>	Term Work						Credits <b>01</b>
	No. of Periods Per Week			Full Marks	:	25	
	L	T	P/S	Internal	:	07	
	—	—	02	External	:	18	

### **CONTENTS : TERM WORK**

#### **Term Work / Assignments:**

Skills to be developed:

#### **Intellectual Skills:**

- a. List various items of work with their units in a Civil Engineering Structure.
- b. Calculate quantities of various items of work.
- c. Prepare rate analysis.

#### **List of Term Work / Assignments:**

- 1) Prepare Check list of items of following type of Civil Engineering works.
  - a) Load Bearing type Building
  - b) Framed structure type building
  - c) W.B.M.Road
  - d) Septic Tank
  - e) Community well
- 2) Writing the rules of deduction's for below mentioned items of work as per IS 1200.
  - a) Brick / Stone masonry.
  - b) Plastering / Pointing
- 3) Taking out quantities of various items of work for load bearing building.
  - i) Earth work in excavation for foundation
  - ii) Base Concrete of foundation
  - iii) U.C.R./BB Masonry work in foundation and plinth.
  - iv) D.P.C.
  - v) Plinth Filling.
  - vi) Brick work in masonry.
  - vii) Flooring
  - viii) Plastering.
  - ix) Wood work in doors & windows
- 4) Taking out quantities of following items for small R.C.C. Hall
  - i) Concreting for footing, Column, Beam, slab.
  - ii) Reinforcement for above items by preparing Schedule of bars.
  - iii) Form work for all above items.
- 5) Preparing detailed estimate of a RCC single & two storied residential building for all items of work. (The quantity of reinforcement shall be calculated by percentage.)
- 6) Preparing Rate analysis of following items:  
Building work – Brick work, P.C.C., R.C.C., Plastering, Flooring, Doors, Windows.
- 7) Taking out quantities of earth work for a Road profile prepared in surveying subject. Prepare the lead statement.
- 8) Taking out quantities of work for a Community well or Jack well or Septic Tank.
- 9) Taking out quantities of work for pipe culvert.

***( Drawings shall be provided for the above exercises by subject teacher.)***

#### **2. Video Cassettes /CDS**

MSBTE CAI Package.  
Q. E. PRO software

#### **3. IS/INTERNATIONAL CODES:**

IS 1200- Method of Measurement of building and Civil engineering works

# **BUILDING SERVICES AND ENTREPRENEURSHIP DEVELOPMENT -TW**

## **(CIVIL ENGINEERING GROUP)**

Subject Code 1615511	Term Work						Credits 02
	No. of Periods Per Week			Full Marks	:	25	
	L	T	P/S	Internal	:	07	
	—	—	05	External	:	18	

### **CONTENTS : TERM WORK**

<b>A: Building Services:</b>		Hrs/week
<b>Unit -1</b>	<b>Plumbing</b> <b>1.1 Elements of plumbing</b> Objectives of plumbing, purpose of plumbing, role of plumber, licensing of plumbers their functions, sewer Air, supply pipes, drainage & vent pipes application for obtaining supply connection. <b>1.2 Pipes joints &amp; fittings</b> Introduction. Types of Pipe – G.I. Pipes, PVC Pipes, Copper pipes, C.I. Pipes, A.C. Pipes, prestressed concrete pipes, joints in pipes, method of fixing pipes such as G.I. fitting C.I. fitting. <b>1.3 Valves &amp; Terminal Fittings</b> Types of valves & its purpose, sluice valve, reflux valve, scour valve, Air relief valve, pressure relief valve, gate valves, Bio-taps & stop valve self closing valve. Flush valve, mixing valve. <b>1.4 Sanitary fixture &amp; Building drainage system</b> Building sanitary fittings – water closet, flushing appliances, urinals, washbasins, flushing cisterns, principles of building drainage siphonic action, traps & its types. Capacity & sizing of pipe, soil pipe, waste pipe, rain water pipe, system of plumbing. Installation of pipes, testing of pipes.	<b>08</b>
<b>Unit -2</b>	<b>Water Proofing Treatment</b> Introduction, material required for water proofing and its specification. Water proofing of water closet and bath room procedure & Cross section. Terrace and basement water proofing, Precautions to be taken while water proofing.	<b>04</b>
<b>Unit - 3</b>	<b>Termite Proofing</b> Introduction, general principles of termite proofing. Methods of termite proofing. Material used in termite proofing treatment.	<b>02</b>
<b>Unit - 4</b>	<b>Damp Proofing</b> Sources of dampness & its effects. Material used for damp proofing, Methods of damp – proofing. Damp proofing treatment in building such as basement, floors, walls.	<b>02</b>
<b>Total</b>		<b>16</b>

**Term Work :**

1. Term Work on joining P.V.C. / G.I. Pipes & fittings/Models and writing report on the process.
2. Term Work based on sanitary fitting like, traps, wash basin & water closet fittings.
3. Prepare drawing for water supply. Layout plan for campus showing following details service pipe, communication pipe. consumer pipe, water meter, rain water pipes
4. Prepare drawing for drainage line plan for campus showing following details: Inspection chambers, sewage pipes, traps, man holes.
5. Market survey for different materials available in market their trade names & rates used for water proofing, termite proofing and damp proofing treatment and writing report on the materials collected.

**Part B : Entrepreneurship Development**

S.No	Students will be able to:
1.	<ul style="list-style-type: none"> <li>Identify entrepreneurship opportunity.</li> </ul>
2.	<ul style="list-style-type: none"> <li>Acquire entrepreneurial values and attitude.</li> </ul>
3.	<ul style="list-style-type: none"> <li>Use the information to prepare project report for business venture.</li> </ul>
4.	<ul style="list-style-type: none"> <li>Develop awareness about enterprise management.</li> </ul>

CONTENTS		Hrs/week
<b>Unit -1</b>	<b>Entrepreneurship, Creativity &amp; Opportunities</b> 1.1) Concept, Classification & Characteristics of Entrepreneur 1.2) Creativity and Risk taking. 1.2.1) Concept of Creativity & Qualities of Creative person. 1.2.2) Risk Situation, Types of risk & risk takers. 1.3) Business Reforms. 1.3.1) Process of Liberalization. 1.3.2) Reform Policies. 1.3.3) Impact of Liberalization. 1.3.4) Emerging high growth areas. 1.4) Business Idea Methods and techniques to generate business idea. 1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea & Feasibility of opportunity 1.6) SWOT Analysis	<b>03</b>
<b>Unit -2</b>	<b>Information and Support Systems</b> 2.1) <b>Information Needed and Their Sources.</b> Information related to project, Information related to support system, Information related to procedures and formalities 2.2) Support Systems 1) Small Scale Business Planning, Requirements. 2) Govt. & Institutional Agencies, Formalities 3) Statutory Requirements and Agencies.	<b>03</b>
<b>Unit -3</b>	<b>Market Assessment</b> 3.1) Marketing –Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	<b>02</b>

<b>Unit -4</b>	<b>Business Finance &amp; Accounts</b> <b>Business Finance</b> 4.1) Cost of Project <ol style="list-style-type: none"> <li>1) Sources of Finance</li> <li>2) Assessment of working capital</li> <li>3) Product costing</li> <li>4) Profitability</li> <li>5) Break Even Analysis</li> <li>6) Financial Ratios and Significance</li> </ol> <b>Business Account</b> 4.2) Accounting Principles, Methodology <ol style="list-style-type: none"> <li>1) Book Keeping</li> <li>2) Financial Statements</li> <li>3) Concept of Audit,</li> </ol>	<b>03</b>
<b>Unit -5</b>	<b>Business Plan &amp; Project Report</b> 5.1) Business plan steps involved from concept to commissioning: Activity Recourses, Time, Cost 5.2) <b>Project Report</b> <ol style="list-style-type: none"> <li>1) Meaning and Importance</li> <li>2) Components of project report/profile <b>(Give list)</b></li> </ol> 5.3) <b>Project Appraisal</b> <ol style="list-style-type: none"> <li>1) Meaning and definition</li> <li>2) Technical, Economic feasibility</li> <li>3) Cost benefit Analysis</li> </ol>	<b>03</b>
<b>Unit -6</b>	<b>Enterprise Management and Modern Trends</b> 6.1) Enterprise Management: - Essential roles of Entrepreneur in managing enterprise <ol style="list-style-type: none"> <li>2) Product Cycle: Concept And Importance</li> <li>3) Probable Causes Of Sickness</li> <li>4) Quality Assurance</li> </ol> Importance of Quality, Importance of testing 6.2) E-Commerce Concept and process 6.3) Global Entrepreneur	<b>02</b>
	<b>Total</b>	<b>16</b>

<b>Text/Reference Books:-</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Plumbing Design & Practice	S. Deolalikar	Sata M.C. Graw hill publishing company, New Delhi
Building services	Prof. S.M. Patil	Patil Publication & Goregaon, Mumbai.
Design & Practical Handbook on plumbing	S.R. Mohan & Vivek Anand	Standard Publishing, New Delhi.
A to Z of practical building and its management	Sandeep Mantri	Mantri Institute of Development & research, Pune.
Building Construction	Bindra & Arora	Dhanpat rai publishing
Building Construction	Rangwala	Charotor publishing House Anand
Building Services and Entrepreneurship Development	Rajiv Sinha	Foundation Publishing
<b>2. IS / International Codes :</b> 1. National Building Code – 1983, Bureau of Indian Standards, New Delhi.		

<b>Text/Reference books :-</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Entrepreneurship Development	E. Gorden K.Natrajan	Himalaya Publishing.
Entrepreneurship Development	Preferred by Colombo plan staff college for Technical education.	Tata Mc Graw Hill Publishing co. ltd. Delhi.
A Manual on How to Prepare a Project Report	J.B.Patel D.G.Allampally	
A Manual on Business Opportunity Identification & Selection	J.B.Patel S.S.Modi	
National Directory of Entrepreneur Motivator & Resource Persons.	S.B.Sareen H. Anil Kumar	
New Initiatives in Entrepreneurship Education & Training	Gautam Jain Debmuni Gupta	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : <a href="mailto:ediindia@sancharnet.in">ediindia@sancharnet.in</a> / <a href="mailto:olpe@ediindia.org">olpe@ediindia.org</a> Website : <a href="http://www.ediindia.org">http://www.ediindia.org</a>
A Handbook of New Entrepreneurs	P.C.Jain	
Evaluation of Entrepreneurship	D.N.Awasthi , Jose Sebastian	
Development Programmes		

The Seven Business Crisis & How to Beat Them.	V.G.Patel	
Entrepreneurship Development of Small Business Enterprises	Poornima M. Charantimath	Pearson Education, New Delhi
Entrepreneurship Development	--	McGraw Hill Publication
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore	Wheeler Publisher New Delhi
Entrepreneurship Development		TTTI, Bhopal / Chandigadh

2) Video Cassettes	
SUBJECT	SOURCE
Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : <a href="mailto:ediindia@sancharnet.in">ediindia@sancharnet.in</a> / <a href="mailto:olpe@ediindia.org">olpe@ediindia.org</a> Website : <a href="http://www.ediindia.org">http://www.ediindia.org</a>
Assessing Entrepreneurial Competencies	
Business Opportunity Selection and Guidance	
Planning for completion & Growth	
Problem solving-An Entrepreneur skill	

Glossary:

Industrial Terms:

Terms related to finance, materials, purchase, sales and taxes.

**Components of Project Report:**

1. Project Summary (One page summary of entire project )
2. Introduction (Promoters, Market Scope/ requirement)
3. Project Concept & Product (Details of product)
4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
5. Manufacturing Process & Technology
6. Plant & Machinery Required
7. Location & Infrastructure required
8. Manpower ( Skilled, unskilled )
9. Raw materials, Consumables & Utilities
10. Working Capital Requirement (Assumptions, requirements)
11. Market ( Survey, Demand & Supply )
12. Cost of Project, Source of Finance