

# Scheme of Teaching and Examination for VI Semester DIPLOMA in CIVIL ENGINEERING

## THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION - SCHEME					
			Periods per Week	Periods in one Session (Year)	Hours of Exam.	Terminal Exam. (A) Marks	Final Exam. (B) Marks	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
1.	Professional Studies & Entrepreneurship	00601	06	60	03	20	80	100	26	36
2.	R.C.C. Structure	15602	06	60	03	20	80	100	26	36
3.	Environmental Engineering	15603	06	60	03	20	80	100	26	36
4.	Construction Technology-II	15604	06	60	03	20	80	100	26	36
5.	Elective*		06	60	03	20	80	100	26	36
	Earthquake resistant design & Construction	15605A								
	Water & Land Management	15605B								
	Town Planning and Architecture	15605C								
	Rural Engineering Technology	15605D								
	Constructional Planning & Project Management	15605E								
<b>Total:-</b>			<b>30</b>		<b>500</b>					

## PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION – SCHEME					
			Periods per Week	Periods in one Session (Year)	Hours of Exam.	Marks Internal Exam. (A)	Marks External Exam. (B)	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
6.	Construction Practice Lab. – II	15606	04	50	06	10	40	50	16	21
7.	Environmental Engineering Lab	15607	04	50	03	10	40	50	16	21
<b>Total:-</b>			<b>08</b>		<b>100</b>					

## SESSIONAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION - SCHEME			
			Periods per Week	Periods in One Session (Year)	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject
8.	Professional Studies & Entrepreneurship	00607	04	50	20	30	50	25
9.	Project Work & Its Presentation in Seminar	15609	—		40	60	100	50
<b>Total:-</b>			<b>04</b>		<b>150</b>			

<b>Total Periods per Week</b>	<b>42</b>	<b>Total Marks = 750</b>
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## PROFESSIONAL STUDIES & ENTREPRENEURSHIP

<b>Subject Code</b> <b>00601</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

### Rationale:

The paper has been introduced to achieve dual purpose for the students. Firstly, this course provides the basics of Professional management and secondly it also prepares the student to develop self reliance by becoming an entrepreneur.

This makes them conversant with their duties and responsibility to make them successful in their career building by developing profession expertise.

### Objectives:

With the input provided in this paper, the students will be able to :-

- Acquire basic knowledge of management.
- Understand the various area of management such as human resources, marketing, finance and commercial aspect, production & material management etc.
- Understand the benefit of becoming an entrepreneur.
- Handle a project efficiently and independently.
- To avail subsidies / grants / loan etc. from various of agencies.

### PART-I: PROFESSIONAL STUDIES

#### TOPIC:

#### 01 – INTRODUCTION:

- |       |   |      |
|-------|---|------|
| 01.01 | Professional Ethics:<br>Definition, Objective, Right & Wrong, Duty & Obligation   | [05] |
| 01.02 | Management:<br>Definition, Function and Objectives.   | [05] |
| 01.03 | Leadership:<br>Definition, Types – Autocratic, Democratic and Laissez – faire, Functions and Characteristics of Leadership. | [05] |
| 01.04 | Motivation :<br>Definition, Types and Importance / Benefits   | [05] |
| 01.05 | Forms of Business organization:<br>Sole proprietorship, Partnership, Joint Stock company and Co-operative Societies.        | [05] |
| 01.06 | Supervisor's/Technician's role:<br>Concept of supervisory management, career needs, Role of Technicians in an organization. | [05] |

### PART-II: ENTREPRENEURSHIP

#### TOPIC:

#### 02 – INTRODUCTION:

- |       |   |      |
|-------|---|------|
| 02.01 | Entrepreneurship:<br>Concept, Characteristics of a successful entrepreneurship, basic ingredients of entrepreneurship:<br>1. Finance 2. Technology 3. Sales and Marketing | [10] |
| 02.02 | Project Report:<br>Meaning, Project Identification, Project Selection, Contents of a project Report, Techno-Economic Feasibility Report (TEFR), Market Survey.            | [10] |

02.03 Sources of Finance: [05]  
Government, Commercial Banks, Financial institutions:  
SIDBI – Small Industries development Bank of India  
SFC – State Financial Corporations  
IDBI – Industrial Development Bank of India  
IFCI – Industrial Finance Corporation of India  
ICICI – Industrial Credit Investment Corporation of India

02.04 Acts : [05]  
Indian factories Act 1948 ( Main Provision Only)  
Consumers Protection Act 1986 ( Main Provision Only)

**03 – PROJECT WORK:**

As elaborated in Sessional Paper (00607).

**Books Recommended :**

1. Essential of Management, Tata McGraw Hill, Publishing Company - Herald Koonz & Cyril O' Donnel.  
Ltd., New Delhi.
2. Business Organization and Management, S. C. Chand and Company - M. C. Shukla.  
(Pvt.) Ltd., Ram Nagar, New Delhi
3. Managerial Economics, Sultan Chand & Sons, New Delhi - R. L. Vashney & K. L. Maheshwari
4. Project Appraisal and Follow up, Govind Prakashan, Mumbai. - D. P. Sharda
5. Modern Marketing Management, Progressive Corporation Pvt. Ltd., - Dr. Rustam S. Davar  
P51, Mahatma Gandhi Road, Bombay-400 001
6. A hand book for new entrepreneurs (with special reference to science - Entrepreneurship Development  
and technology target group) Institute of India, 83-A,  
Swastic Society Navrangpura,  
Ahmedabad, PIN-380 009.

**Reference Books:**

1. Leadership in Organisation - Published by I.S.T.E. Mysore
2. Motivation - Published by I.S.T.E. Mysore
3. Motivation - I.I.T. Kanpur - Published by I.S.T.E. Mysore
4. A Hand book on Project Appraisal and follow up, Govind Prakashan, - D. P. Sarda  
204, Saraswati Kunj, 90, S. V. Road, Goregoan, Bombay-400 062.
5. Bihar Industrial Policy - Government of Bihar,  
Department of Industries.
6. Entrepreneurship Guide - Bihar State Financial  
Corporation, Fraser Road, Patna-  
800 001.

# R.C.C. STRUCTURE

<b>Subject Code 15602</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		<b>:</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>		<b>:</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>		<b>:</b>
					<b>100</b>	
					<b>80</b>	
					<b>20</b>	

## Rationale & Objective:

The subject forms an important part of Civil Engineering curriculum. Concrete and steel are the most useful and versatile modern building materials.

A Civil Engineering Technician must have a sound knowledge of the subject so that he may be able to execute economical and sound design of structures by limit state design method based on specifications laid down in IS code 456-2000 in conjunction with seismic ductility detailing as per IS code 13920 and IS 4326.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Loads and Stresses in R. C. C. structures	(04)
02	R. C. C. Beams(Single Reinforced)	(10)
03	R. C. C. Beams(Double Reinforced)	(06)
04	R. C. C. Flanged Beams (T & L Beams)	(05)
05	R. C. C. Slabs Spanning in one direction	(04)
06	R. C. C. Slabs Spanning in two direction	(05)
07	R. C. C. Columns-Axial and Bi-Axial moment	(10)
08	R. C. C. Footings and Foundation	(08)
09	Pre-stressed Concrete	(04)
10	Working Stress Method Design	(04)
<b>Total:</b>		<b>(60)</b>

## CONTENTS:

### **TOPIC: 01 – LOADS AND STRESSES IN R. C. C. STRUCTURES :** **[04]**

- 01.01 Dead Load. Live Loads. Wind Loads.
- 01.02 Seismic Loads, Calculation of Design Seismic force and their distribution as per IS 1893:2002
- 01.03 Elementary idea about effect of temperature, shrinkage and creep on R. C. C. structures, Types of reinforcements and grades of concrete, their properties and permissible stresses
- 01.04 Method of design of R. C. C. Sections, Assumption in Limit State method, Stress-Strain relationship for steel and Concrete, Limit state of collapse in flexure.

### **TOPIC: 02 – R. C. C. BEAMS (SINGLE REINFORCEMENT) [L.S.]:** **[10]**

- 02.01 Bending strength of singly Reinforced Beams.
- 02.02 Calculation of stresses developed in steel and concrete.
- 02.03 Design of Singly reinforced beam section. Control of deflection and slenderness Limits for Beams.
- 02.04 Shear strength of R. C. C. beams, R. C. C. beams with vertical stirrups with bent up bars and with inclined bars (Stirrups), Functions of shear reinforcement, Design of shear Reinforcement, Seismic hooks.
- 02.05 Bond in R. C. C. beams, Bond stresses, Development length of reinforced bars in Tension.
- 02.06 Acquaintance with IS-provisions for curtailment of Tension. Reinforcement in beams, condition for curtailment of flexural reinforcement in tension zone, special requirement near points of zero moment for curtailment of tension Reinforcement, Bar splices.

**TOPIC: 03 – R. C. C. BEAMS (DOUBLY REINFORCED) :** [06]

- 03.01 Necessity of Double Reinforced Section, location of Natural axis, Bending strength of Doubly reinforced beams.
- 03.02 Calculation of stresses developed in concrete and steel of Doubly reinforced beams.
- 03.03 Design of Doubly reinforced beam
- 03.04 Shear stresses in doubly reinforced beams
- 03.05 Acquaintance with IS provisions for curtailment of Tension. Reinforcement in beams, condition for curtailment of flexural reinforcement in tension moment for curtailment of tension Reinforcement, Bar splices.

**TOPIC: 04 – R. C. C. FLANGED BEAMS (T & L BEAMS) [L.S.]:** [05]

- 04.01 Effective width of flange, Location of Natural axis, Lever arm for T and L sections.
- 04.02 Bending strength of T Beam and L Beam.
- 04.03 Calculation of stresses developed in concrete and steel of T-Beams and L-Beams.

**TOPIC: 05 – R. C. C. SLAB SPANNING IN ONE DIRECTION [L.S.] :** [04]

- 05.01 Design of simply supported slab and continuous slab as per IS provision.
- 05.02 Design of Cantilever slabs, sunshade

**TOPIC: 06 – R. C. C. SLAB SPANNING IN TWO DIRECTION [L.S.]:** [05]

- 06.01 Behaviour of slabs spanning in two directions with corners not held down by Grass hoff-Rankine Method.
- 06.02 Restrained slab with corners held down as per IS 456-1978.
- 06.03 Shear in Two way slab, provision of corner reinforcement, idea about different end conditions and their B. M. coefficient.

**TOPIC: 07 – R. C. C. COLUMNS- AXIAL AND BI-AXIAL MOMENT [L.S.] :** [05]

- 07.01 Effective length of compression members, equivalent sectional area of columns. Radius of Gyration of column section, Slenderness Ratio of compression members, I. S. criteria for eccentricity.
- 07.02 Strength of long and short columns (Square, Rectangular and Circular columns).
- 07.03 Design of long and short columns(Square, Rectangular and Circular column with helical Re-inforcement).
- 07.04 Beam Column joints and their seismic ductile detailing as per IS Code-13920(latest revision)

**TOPIC: 08 – R. C. C. FOOTING AND FOUNDATION [L.S.] :** [08]

- 08.01 Types of independent footing, Depth of foundation, thickness of edge of footing, Liquefaction, Mitigation of Liquefaction.
- 08.02 Shear force in Footing.
- 08.03 Design of footing for masonry and concrete wall.
- 08.04 Design of footing for a square and rectangular column.

**TOPIC: 09 – PRE STRESSED CONCRETE:** [04]

- 09.01 Basic principle, assumption and stress diagram.
- 09.02 Methods of prestressing.
- 09.03 Advantages and disadvantages of prestressing.
- 09.04 General idea about losses in prestressing.

**TOPIC: 10 – WORKING STRESS METHOD OF DESIGN:** [04]

- 10.01 Introduction and definition.
- 10.02 Basic assumptions.
- 10.03 Analysis of rectangular singly reinforced section.

## Books Recommended:

### Text Books

1. R. C. C. - J. Jha
2. प्रबलित कंक्रीट अभिकल्पन . भिनोचा एवं द्विवेदी
3. प्रबलित सीमेंट कंक्रीट बी. एन. झा
4. R. C. C. - Agrawal
5. R. C. C. - Rama Ruthan
6. Concrete Structure for Diploma Holders - Vaziranil Ratwani
7. R. C. C. Structure Volume I - B. C. Punamia
8. Plain Reinforced Concrete - Jain
9. R. C. C. Design - Patwardhan
10. R. C. C. Theory & Design - Sah & Kale
11. R. C. C. - Malick & Gupta
12. Text Book of Concrete Technology - B. L. Gupta
13. Concrete Technology - Vaziraw & Chando
14. Concrete Technology - Gambhir
15. R. C. Structure - I. C. Syal
16. Prestressed Concrete - Vaziraw & Chando
17. Limit State Design - A. K. Jain
18. प्रबलित सीमेंट कंक्रीट . गुरुचरण सिंह

# ENVIRONMENTAL ENGINEERING

<b>Subject Code 15603</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

### Rationale and Objective:

Environmental Engineering is the only Subject of Civil Engineering which directly related to the human health and therefore it is known as Public Health Engineering. It is also utilized to control the environment for the protection of health and comfort of all living beings on this earth as well as human being. No life can exist without water or it can be said that water is an essential for life as air is. With the rapid industrialization and abrupt growth in population increases water quantity demand and also affects its quality. The standard quality of water or portable water can not be imagined without proper sanitation. As this problem is related to the community, the environment around our society can not be untouched in Technician Education System of developing country like India in general and our State, Bihar in particular. Therefore, this subject has been divided into three groups as:-

- (A) Water Supply Engineering,
- (B) Sanitation Engineering, and
- (C) Environmental Engineering.

The following topics with contents are capable in generating the knowledge, skill and proper attitude of technicians to provide potable water as it is not replicable and they will be able to motivate the users for adoption of Sanitary practices which will create hygienic environment.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
<b>Group-A : Water Supply Engineering</b>		<b>30</b>
01	Water Sources	(02)
02	Quantity of Water	(03)
03	Quality of Water	(04)
04	Treatment of Water	(11)
05	Conveyance & Distribution of Water	(10)
<b>Group-B : Sanitation Engineering</b>		<b>21</b>
06	Sewage Disposal	(02)
07	Drains & Sewers	(02)
08	Sewer Appurtenances	(03)
09	Characteristics & Examination of Sewage	(04)
10	Sewage Treatment & Disposal	(10)
<b>Group-C : Environmental Engineering</b>		<b>{09}</b>
11	Ecosystem Ecological Balance of Nature	(09)
<b>Total :</b>		<b>60</b>

### CONTENTS:

<b><u>TOPIC: 01 – WATER SOURCES :</u></b>		<b>[02]</b>
01.01	Need for protected water sources.	
01.02	Types of water sources(Surface sources & Under ground water sources).	
01.03	Factors affecting choice of water supply sources.	
<b><u>TOPIC: 02 – QUANTITY OF WATER:</u></b>		<b>[03]</b>
02.01	Water Requirement for different purpose & B. I. S. Standards for per capita consumption of water.	
02.02	Factors affecting the rate of water demand.	
02.03	Different methods for estimation of population and Numerical problems associated with it.	

<b><u>TOPIC: 03 –QUALITY OF WATER:</u></b>	<b>[04]</b>
03.01	Methods & Precautions in collecting water samples.
03.02	Water Analysis (Laboratory Method).
03.02.01	Physical Analysis.
03.02.02	Chemical Analysis.
03.02.03	Bacteriological Analysis.
03.03	Water Borne Diseases.
03.04	B.I.S. & WHO standards of potable water.
<b><u>TOPIC: 04 –TREATMENT OF WATER:</u></b>	<b>[11]</b>
04.01	Different types of impurities in water.
04.02	Objectives of water treatment.
04.03	Water treatment processes.
04.03.01	Sedimentation (Principle & types of sedimentation Tanks only)
04.03.02	Sedimentation with coagulation. (Necessity, principle, common coagulants and choice of Coagulant, Optimum coagulant, Dose determination, Coagulation process and its limitations only)
04.03.03	Filtration (Objects, theory and classification of filtration, comparison between slow sand Filters & Rapid sand Filters and Washing Methods of Filters only)
04.03.04	Disinfection (Objective, criteria for a good disinfectant, Methods of disinfection, Different Forms and classification of chlorination only)
04.03.05	Typical Layout of a water Treatment plant.
<b><u>TOPIC: 05 –CONVEYANCE &amp; DISTRIBUTION OF WATER:</u></b>	<b>[10]</b>
05.01	Intake (types and selection of site only)
05.02	Different types of pipes.
05.03	Use of valve (sluice valve, Pressure Relief Valves, Check Valves, Air Relief Valves & Drain Valves).
05.04	Description & Working Principle of Fire Hydrant.
05.05	Distribution System of Water. (Gravity, Pumping & Dual System)
05.06	Methods of Distribution. (Dead End, Grid Iron, Radial and Ring System).
05.07	Types of Reservoirs. (Earth Reservoir, Masonry & R. C. C. Reservoir, Elevated Reservoirs-Stand pipes & Elevated tanks.)
05.08	General Layout of water supply arrangements for Residential Building only.
<b><u>TOPIC: 06 –SEWAGE DISPOSAL:</u></b>	<b>[02]</b>
06.01	Common Technical Terms used in Sanitary Engg.
06.02	Methods of Disposal Sewage. (Conservancy system, Water Carriage System and their comparison)
06.03	Sewerage System (Comparison among combined, separate & Partially separate system only)
<b><u>TOPIC: 07 –DRAINS &amp; SEWERS:</u></b>	<b>[02]</b>
07.01	Common sections of drains and sewers.
07.02	Types of Sewers & Cleaning of Sewers.
07.03	Minimum, Maximum & Self Cleaning Velocity for design of Sewers.
<b><u>TOPIC: 08 –SEWERS APPURTENANCES:</u></b>	<b>[03]</b>
08.01	Locations, functions & construction of Manholes, Drop hole, Street inlet, Catch Basins, Flushing Tanks, inverted syphons & Regulators.
<b><u>TOPIC: 09 –CHARACTERISTICS &amp; EXAMINATION OF SEWAGE:</u></b>	<b>[04]</b>
09.01	Methods of Sampling of Sewage.
09.02	Physical, Chemical and Biological Properties.
09.03	Aerobic and Anaerobic Decomposition.
09.04	B.O.D. and C.O.D. tests.



**TOPIC: 10 –SEWAGE TREATMENT & DISPOSAL:**

[10]

- 10.01 Objectives of Sewage Treatment.
- 10.02 Classification of Treatment Processes  
(Preliminary, Primary & Secondary treatment including Disinfection).
- 10.03 Principle Description advantages & disadvantages of intermittent Sand Filters & trickling filters.
- 10.04 Activated Sludge Process  
(Concept, Operation, Advantages & Disadvantages only).
- 10.04.01 Methods of aeration and aerator.
- 10.04.02 Simple methods of sludge Disposal.
- 10.05 Sewage Disposal  
(Natural & Artificial methods).
- 10.06 Miscellaneous Treatment of Sewage  
(Oxidation Pond, Aerated Lagoons, Oxidation Ditch & Anaerobic Lagoons.)
- 10.07 Sanitary Latrine.
- 10.07.01 Various Flushing Systems.
- 10.07.02 Principle, Working and Design of Septic Tank including numerical problems related to the design of septic tank for different numbers of users.
- 10.08 Construction, Operation & Maintenance of Bio-gas Plant.

**TOPIC: 11 –ECO-SYSTEM & ECOLOGICAL BALANCE OF NATURE:**

[09]

- 11.01 Definition of common technical terms related to Environmental Pollution.
- 11.02 Water Pollution (Cause & its effects)
- 11.03 Air Pollution (brief idea, Classification, sources & its effect)
- 11.04 Noise Pollution (concept and effects on human health)

**Books Recommended:**

1. Water Supply & Sanitary Engg. (Environmental Engg.), Charotar Publishing House, Anand-388001 - S. C. Rangwala
2. Water Supply Engg., Khanna Publishers, New Delhi-110006 - S. K. Garg
3. Sewage Disposal & Air Pollution Engg., Khanna Publishers, New Delhi-110006 - S. K. Garg
4. Environmental Engg., Khanna Publishers, New Delhi-110006 - Dr. B. Kapoor
5. Water Supply waste Disposal & Environmental Engg., Standard Pub., Delhi-110006 - A. K. Chatterjee
6. Water Supply & Sanitary Engg., Standard Pub., Delhi-110006 - Gurucharan Singh
7. जल सम्भरण, सफाई एवं पर्यावरण इंजीनियरी - Gurucharan Singh
8. Water Supply and Sanitary Engineering including Environmental Engg., Dhanpat Rai Pub. Company, New Delhi - G. S. Birdie & J. S. Birdia
9. Public Health Engg., Styra Prakashan, New Delhi-110006 - S. K. Hussain

**Reference Books :**

1. Environmental Engg., Tata McGraw Hill Com., New Delhi-110002 - A. Kamala
2. Ground Water, Scitech Pub., Chennai-600017 - Ramkrishnan
3. Pollution Prevention Technology Hand Book, Standard Pub., Delhi-110006 - Robert Noyes
4. सोसायटी एवं पर्यावरण अभियांत्रिकी, Standard Pub., Delhi-110006 - K. N. Vyas
5. Water Supply & Waste Water Engg., S. K. Kataria & Sons Pub., Ludhiana, Delhi - A. K. Upadhyay
6. Relevent B. I. S. Code, B.I.S. -
7. Environmental Health & Technology, Pragati Prakashan, Meerut - Khudesia V. P. & Khudesia Ritu
8. Water Pollution, Pragati Prakashan, Meerut - Khudesia V. P.
9. Air Pollution, Pragati Prakashan, Meerut - Khudesia V. P.
10. Physio-chemical Examination of Waste Sewage & Industrial Effluent, Pragati Prakashan, Meerut - Manivasakam N.
11. The Water & Air Pollution Acts.

## CONSTRUCTION TECHNOLOGY-II

<b>Subject Code 15604</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

### Rationale and Objective:

It is well known that the important function of a Civil Engg technician is to supervise the constructional work of the structure. During supervision, the technician. Concrete technology and method of construction of structures so that he may establish the proper link between him and the mason on the above basis. The present curriculum has been divided into three groups as (a) Construction Practice of Earthquake Resistant Building (b) Concrete Technology and (c) Building Construction Technology.

The following Topics with the concrete are able to generate the knowledge, skill and proper attitude of technician towards the construction of structure in strict accordance with the presented specification and detail drawings.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
<b>Group-A : Construction Practice of Earthquake Resistant Buildings</b>		
01	Detailing as Per IS 4326:1993	(12)
<b>Group-B : Concrete Technology</b>		
02	Material for Cement Concrete	(05)
03	Preparation & Properties of Concrete	(05)
<b>Group-C : Building Construction Technology</b>		
04	Floors	(04)
05	Facing	(05)
06	Provision in Modern Building	(06)
07	Precast Building Component	(05)
08	Acoustics of Building	(04)
09	Maintenance of Building	(06)
10	Miscellaneous Topics	(04)
11	Building by laws & Safety Measures	(04)
<b>Total :</b>		<b>(60)</b>

### CONTENTS:

#### TOPIC: 01 - DETAILING AS PER IS 4326 : [12]

- 01.01 Building Configuration to minimise Seismic Vulnerability
- 01.02 Separation of Adjoining Structures
- 01.03 Details of Separation or Crumble Section, Staircases
- 01.04 Types of Construction-Framed & Box type strengthening measures doe opening in walls.
- 01.05 Different Bands in a Building and reinforcement detailing at bands.
- 01.06 Improving earthquake resistance of earthen buildings

**TOPIC: 02 –MATERIAL FOR CEMENT CONCRETE:** [05]

- 02.01 Cement Portland Cement-Specification and tests prescribed by B I S in respect of fineness, consistancy, soundness, setting time and compressive strength, Reactions with water.
- 02.02 Aggregate: Classification of aggregates and their specifications(particle shape, texture, bend of aggregates, Moisture content of aggregate.
- 02.03 Sand Bulking of Sand fineness modulus.
- 02.04 Water-Specification of water for manufacturing concrere.
- 02.05 Admixture-Function of admixtures, their purpose Limits and their use, classification of admixtures like water proofing agents. Air Entering agents Retarders. Accelators and Gas forming agents.

**TOPIC: 03 –PREPARATION & PROPERTIES OF CONCRETE:** [05]

- 03.01 Measurment of materials, Bulking and moisture content of aggregates consistency, segregation and Bleeding of concrete. Durability of concrete, Water Cement ratio.
- 03.02 Workability of concrete-Factors affecting workability and its limitation, slump test, compaction Factor test.
- 03.03 Comprssive and tensile strength of concrete-compressive strength cube and cylinder strength, Young's modulus of Elasticity of concrete, Creep of concrete, strength in diagonal tension and tensile strength of concrete.

**TOPIC: 04 – FLOORS:** [04]

- 04.01 Suitability of different types of floor in several Civil Engg. Construction. Method of construction of suitable type of floors in workshop.

**TOPIC: 05 – FACING:** [05]

- 05.01 Decorative finish for exterior plastering wall with marble, gravel, mosaic vengal tiles.
- 05.02 Decorative finish for interior use of plywood. Laminated boards, glass, wall papers, ceronic tiles and special paints, artificial ceiling and concealed lighting.

**TOPIC: 06 –PROVISION IN MODERN BUILDING:** [06]

Lifts and escalaters, arrangement for heating and cooling of rooms, use of exhaust fans specially water supply and sanitary fittings.

**TOPIC: 07 –PRECAST BUILDING COMPONENT:** [05]

- 07.01 Standarisation of elements-Wall, lintel, slabs and mass production, joints in precast construction, Modular coordination.

**TOPIC: 08 –ACCOUSTICS OF BUILDING:** [04]

- 08.01 Technical terms used in accoustics of building. Requirements for sound effects. Factors to be considered in accoustics of buildings, optimum lime of reverberation.
- 08.02 Sound absorbing materials-Requirements of a good sound absorbing materials. Accoustics analysis and its correction.
- 08.03 Sound-Insulation and method of sound insulation.

**TOPIC: 09 –MAINTENANCE OF BUILDING:** [06]

- 09.01 Maintenance of building-Classification, Routine maintenance and Special Repairs. Detailed study for different types of repair work under Routine maintenance and special repairs.

**TOPIC: 10 –MISCELLANEOUS TOPICS:****[04]**

10.01 Elementry idea of

1. Antitermite treatment
2. Fire resistance

10.02 Termite detection factors in building, termite proofing methods.

**TOPIC: 11 –BUILDING BY LAWS & SAFETY MEASURES:****[04]**

11.01 Building by laws, necessities, principles, provision as per national building code.

11.02 Safety programme for construction, safety measures at construction site i.e. barricades strong scaffolding, red signals, helmet etc. Precaution to be taken to avoid accidents. Precautions for health hazards and safety measures while using chemicals for antitermite treatments.

**Books Recommended:**

1. Soil Mechanics & Foundation Engg., Standard Book House, - Dr. B. C. Punamia  
Delhi-6
2. A Text Book of Building Construction, Dhanpat Rai & Sons. - Arora & Bindra
3. Building Construction Technology (Hindi), ASI - Gupta
4. National Building Code - N. B. O., Delhi
5. Relevant Indian Standard - B. I. S.
6. Soil Engg. Theory & Practice Vol. I - Dr. Alam Singh
7. Concrete Structure Vol. IV - Vazirani & Ratwani
8. A Text Book of Building Construction - Sushil Kumar
9. Hkou fuekZ.k VsDuksykWth - Gurucharan Singh
10. भवन निर्माण - G. D. Aggrawal
11. भवन निर्माण - Das
12. Building Construction - Sushil Kumar
13. Building Construction - Ranga Wala
14. Construction & Foundation Engg. - J. Jha
15. Building Construction - Vazirani
16. Building Construction - Punania
17. Building Material & Construction - C B R I. Roorki
18. Building (Tech & Valuation) - T. T. T. I., Madras
19. भूदा यांत्रिकी - J. Jha
20. Soil Mechanics - Punamia
21. Engineering Properties of Soil, T. M. H. - S. K. Gulati

# EARTHQUAKE RESISTANT DESIGN & CONSTRUCTION

<b>Subject Code 15605A</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		<b>: 100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>		<b>: 80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>		<b>: 20</b>

**Rationale & Objectives:**

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	The Earthquakes	(06)
02	Vibrations of Single Degree of freedom System	(20)
03	Vibration of Multiple Degrees of Freedom System	(08)
04	Earthquake Motion & Reponse	(06)
05	Aseismic Design of Structures	(20)
<b>Total :</b>		<b>(60)</b>

**CONTENTS:**

**TOPIC: 01 – THE EARTHQUAKES [06]**

- 01.01 Earthquakes
- 01.02 Epicentre, hypocentre and earthquake waves
- 01.03 Measurement of Ground Motion
- 01.04 Cause of Earthquake (Plate tectonic)
- 01.05 Intensity and Isoleisms of an earthquake
- 01.06 Magnitude and Energy of an earthquake
- 01.07 Relationship of fault length, affected area and duration with magnitude
- 01.08 Consequences of earthquakes
- 01.09 Sesimic Zoning
- 01.10 Risk Maps
- 01.11 Strong Ground Motion Arrays

**TOPIC: 02 – VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEM: [20]**

- 02.01 Types of Vibrations
- 02.02 Degrees of Freedom
- 02.03 Spring action and damping
- 02.04 Equation of motion of single degree of freedom
- 02.05 Free Vibrations of Undamped systems having single degree of freedom
- 02.06 Combination of stiffnesses
- 02.07 Vibration of Damped System having single degree of freedom
- 02.08 Dry Friction Damping
- 02.09 Negative Damping
- 02.10 Forced Vibration of a Undamped System

- 02.11 Forced vibrations of a damped system
- 02.12 Equivalent viscous damping
- 02.13 Vibration isolation
- 02.14 Vibration Measuring Instruments
- 02.15 System subjected to transient forces

**TOPIC: 03 – VIBRATION OF MULTIPLE DEGREES OF FREEDOM SYSTEMS:** [08]

- 03.01 Introduction
- 03.02 Two Degrees of freedom
- 03.03 Many degrees of freedom
- 03.04 Forced vibration – earthquake excitation

**TOPIC: 04 – EARTHQUAKE MOTION AND RESPONSE:** [06]

- 04.01 Introduction
- 04.02 Strong motion earthquakes
- 04.03 Numerical method for spectra
- 04.04 Elastic spectra
- 04.05 Ground velocity and displacement
- 04.06 Inelastic spectra

**TOPIC: 05 – ASEISMIC DESIGN OF STRUCTURES:** [06]

- 05.01 Design data and philosophy of design
- 05.02 Multistory Buildings(G+2) Design-Analysis Design
- 05.03 Earthquake resistant construction of buildings
- 05.04 Ductility provisions in reinforced concrete construction
- 05.05 Base Isolation
- 05.06 Capacity building Design and Pushover Analysis
- 05.07 Retrofitting of Buildings

**Books Recommended:**

- |   |                     |
|---|---------------------|
| 1. Earthquake Resistant Design & Analysis                           | - Jai Krishna.      |
| 2. Dynamic of Structures  | - Mario Paz.        |
| 3. Dynamic of Structures  | - A. K. Chopra.     |
| 4. IS : 1893-2002; IS : 13920-1993; IS : 13828-1993, IS : 4326-1993 | -                   |
| 5. Theory of Structures   | - Farzard Naim.     |
| 6. Dynamics of Structures   | - Clough & Penzien. |

# WATER & LAND MANAGEMENT

<b>Subject Code 15605B</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale :**

Irrigation provides livelihoods for hundreds of millions of people in developing countries. In parts of South Asia, where it has been a massive thrust in rural and national development, extensive irrigation network, co-exist with the greatest concentration of rural population in the world. In India, due to limitation of topography, climate, soils, present technology, handling of pollutants etc., all the surface and ground water cannot be fully utilized. The actual quantity of water for irrigation, however, is likely to reduce in view of the growing demands of water for other human needs and industry. This there is urgent need of the course is being introduced for the Civil Engineering students as an Elective that the interested students may be benefited.

**Objective:**

The students should be able to :

1. Understand Soil- Water – Plant Relationship
2. Estimate Evapotranspiration for a given set of data
3. Estimate Irrigation requirement, Field Irrigation Requirement and Gross Irrigation Requirement.
4. Understand micro level planning, layout of chaks, sub-chaks, water courses. Field Channels and Field Drains.
5. Understand Structures in water courses and water measuring devices.
6. Understand land leveling and land consolidation.
7. Understand importance of farmer’s participation in water and land management.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Water Resources of India with special reference to Bihar.	(04)
02	Soil-Water-Plant Relationship.	(10)
03	Conjunctive use of surface and ground water.	(02)
04	Micro level planning.	(04)
05	Water Application Methods.	(06)
06	Structures and water measuring devices in watercourses.	(06)
07	Land leveling and Land consolidation.	(06)
08	On-farm Drainage System.	(08)
09	Operation and Maintenance of micro level system.	(05)
10	Water–shed management.	(04)
11	Farmer’s participation in Irrigation water Management.	(05)
<b>Total :</b>		<b>(60)</b>

**CONTENTS:**

**TOPIC: 01 – WATER RESOURCES IN INDIA WITH, SPECIAL REFERENCE OF BIHAR : [04]**

- 01.01 Introduction, national Water Policy and State Water Policy.
- 01.02 Irrigation potential of India with special reference to Bihar, Irrigation management objectives.

**TOPIC: 02 – SOIL-WATER-PLANT RELATIONSHIP : [10]**

- 02.01 Importance of Study of soil-water-plant relationship, introduction to physical and chemical properties of soils used for agricultural purposes, eg. Field capacity, wilting point, Available soil moisture and management allowable deficit.
- 02.02 Water requirement of crops, consumptive use, Availability of soil-water, duty and delta, factors Affecting duty.
- 02.03 Evapotranspiration by modified panmen method, Cropping pattern and cropping intensity.
- 02.04 Crop-coefficient (Kc), Crop-evapotranspiration, Effective rainfall, Special irrigation needs of crops.
- 02.05 Estimation on Net Irrigation Requirement, Field Irrigation Requirement and Gross irrigation Requirement and assessment of peak fortnightly Demand of irrigation water.

<b><u>TOPIC: 03 – CONJUNCTIVE USE OF SURFACE AND GROUND WATER :</u></b>	<b>[02]</b>
03.01 Importance of ground water and planning for its integrated use with canal water.	
<b><u>TOPIC: 04 – MICRO LEVEL PLANNING:</u></b>	<b>[04]</b>
04.01 Introduction, micro level planning, topographical survey, soil survey, layout of chaks and sub-chaks, layout of water courses, field channels and field drains, farms roads.	
<b><u>TOPIC: 05 – WATER APPLICATION METHODS :</u></b>	<b>[06]</b>
05.01 Water application methods, eg. Border, Furrow, Basin. Drip, Sprinkler systems etc.	
<b><u>TOPIC: 06 – STRUCTURES AND WATER MEASURING DEVICES:</u></b>	<b>[06]</b>
06.01 Structures in water courses-outlets, Turnouts / Division box, falls, cross-drainage works etc.	
06.02 Water measuring devices, needs and importance in Water management, V-notch and cut-Throat flumes.	
<b><u>TOPIC: 07 – LAND LEVELING AND LAND CONSOLIDATION :</u></b>	<b>[06]</b>
07.01 Land shaping, Land grading, designs of land shaping-Plane or centroid method and profile method.	
07.02 Land consolidation – Advantages, Acts of land Consolidation with reference to Bihar.	
<b><u>TOPIC: 08 – ON FARM DRAINAGE SYSTEM:</u></b>	<b>[08]</b>
08.01 Definition of water logging and drainage in irrigated areas, selection of a drainage system, causes and effects of water logging and its remedial measures.	
08.02 Type of drains investigation, planning and design of surface drains.	
08.03 Quality of irrigation water, salinity and alkalinity, causes and remedial measures, Leaching and Leaching requirements, land Reclamation techniques with special reference to Bihar.	
<b><u>TOPIC: 09 – OPERATION AND MAINTENANCE OF MICRO-LEVEL SYSTEM:</u></b>	<b>[05]</b>
09.01 Needs and objectives of scientific operation plan, parameters governing operation plan, warabandi system with special reference to Bihar and farmer’s involvement in execution of operation plan.	
09.02 Maintenance of on farm development works.	
<b><u>TOPIC: 10 – WATERSHED MANAGEMENT:</u></b>	<b>[04]</b>
10.01 Watershed Management, water harvesting techniques, Soil conservation measures and catchment area treatment.	
<b><u>TOPIC: 11 – FARMER’S PARTICIPATION IN IRRIGATION WATER MANAGEMENT:</u></b>	<b>[05]</b>
11.01 Needs and strategies of formation of Farmers organization, acts, rules and byelaws, rights and duties of water users Association.	

**Books Recommended:**

1. Irrigation: Theory and Practice, Vikas Publication, New Delhi - A.M. Micheal.
2. On-Farm Development Works, Publication No : 12, Walmi, Aurangabad, Maharashtra -

**Reference Books:**

1. Soil-water-plant Relation ship Publication No : 33, Walmi, Aurangabad, Maharashtra. -
2. USBR Drainage Manual, Oxford and IBH, New Delhi. -
3. Fundamentals of Irrigation Engineering, New Chand & Bros., Roorkee. - Bharat Singh.
4. Irrigation and Water Power Engineering, Standard Publishers & Distributors, Delhi-6 - B.C. Punamia, Pandey & B.B. Lal.
5. Managing Canal Irrigation, Oxford & IBH, New Delhi. - Robert Chambers.
6. Irrigation Engg. - Gurcharan Singh.
7. भूमि सुधार के सिद्धान्त Vol. I & II - J.Jha.
8. Water Resource Planning & Management. - V.K. Sharma.
9. Ground water Assessment and Management - Karnath.
10. Water Resources system Planning & Management. - Chaturvedi.
11. Flood control & Drainage Engineering. - S.N. Ghosh



# TOWN PLANNING AND ARCHITECTURE

<b>Subject Code 15605C</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

## **Rationale and Objective:**

Town planning is considered as art of shaping and guiding the physical growth of the town creating buildings and environment to meet the various needs such as social, cultural, economic and recreational and to provide healthy conditions for both rich and poor to live to work and to play or relax. The course will benefit those students who are interested in the town planning and Architecture and opt for the subject as an elective.

The objective of the course is to make the students familiar with the terms associated with the subject, the students will develop the knowledge and understanding of every aspect of the town planning and architecture.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
<b>Part-A : Town Planning</b>		
01	Introduction.	(02)
02	Growth of Town.	(03)
03	Elements of city plan.	(04)
04	Surveys.	(03)
05	Zoning.	(03)
06	Housing.	(03)
07	Slums.	(03)
08	Necessity of Recreational facilities.	(03)
09	Public Building and Town Planning.	(04)
10	Communication and Traffic Control.	(04)
11	Master Plan.	(04)
<b>Part-B : Architecture</b>		
12	Principles of Architecture.	(03)
13	Fundamental Planning of Building.	(05)
14	Architectural Composition.	(08)
15	Site Selection and orientation of Residential Buildings.	(08)
<b>Total :</b>		<b>(60)</b>

## **CONTENTS:**

### **PART-A : TOWN PLANNING**

#### **TOPIC:01 -INTRODUCTION:** **[02]**

01.01 Aims and objectives of town planning Principles of town planning Necessity of town planning, from of planning.

#### **TOPIC: 02 -GROWTH OF TOWN:** **[03]**

02.01 Origin of town, types of town stage in the growth of town, methods of external growth.  
 (i) Growth according to origin.  
 Growth according to direction.

**TOPIC: 03 -ELEMENTS OF CITY PLAN:** [04]

- 03.01 Introduction, elements of city plan, Distribution of lands, Methods of financing a Town planning scheme, aesthetics of Town planning
- Creative measures
  - Preventive measures
- Destructive measures

**TOPIC: 04-SURVEYS:** [03]

- 04.01 Necessity, collection of Data. Types of surveys.
- 04.02 Town Survey
- Physical Surveys
  - Social survey
  - Economic survey
- Traffic survey
- 04.03 Regional survey, National survey, Social & Economic Survey, perform a social economic survey, methods employed to collect data, preparation of maps and drawing, report.

**TOPIC: 05 -ZONING:** [03]

- 05.01 Importance of zoning, classification of zoning, use of zoning, Height of zoning, Density of zoning, zoning power.

**TOPIC: 06-HOUSING:** [03]

- 06.01 Introduction, layout of residential units, Neighbourhood, unit planning, principles of neighbourhood planning, Reilly plan, Radburn plan, Types of layouts, classification of housing, Housing problem in India, Agencies for Housing scheme.

**TOPIC: 07 -SLUMS:** [03]

- 07.01 Meaning of slum, causes of slums, effects of slums, precaution to be taken against formation of slums, slum clearance, Financial Assistance for slum, clearance scheme.

**TOPIC: 08-NECESSITY OF RECREATIONAL FACILITIES:** [03]

- 08.01 Features of public recreational system. Selection of sites for parks and play grounds. Types of recreational systems, various forms of recreational amenities, standard of open space, Landscape Architecture.

**TOPIC: 09 -PUBLIC BUILDING AND TOWN PLANNING:** [04]

- 09.01 Importance of public buildings, selection of site for Public buildings, grouping of public buildings.

**TOPIC: 10 -COMMUNICATION AND TRAFFIC CONTROL:** [04]

- 10.01 Function of Roads, Requirements of ideal city, Aesthetics of Road, Factors to be considered in the design to town road. Classification of roads. Roads system traffic Management traffic conjection in cities Disadvantages of traffic conjection. Traffic control, types of road junction, parking facilities Traffic Control devices.

**TOPIC: 11 -MASTER PLAN:** [04]

- 11.01 Definition of the master plan, necessity of master plan. Maps to be prepared, Features of master plan.

## **PART-B : ARCHITECTURE**

### **TOPIC: 12 -PRINCIPLES OF ARCHITECTURE:** [03]

12.01 General background, Evaluation of Architecture, Definition of Architecture, Elements affecting Architecture, Aims of Architecture, Principles of Architecture.

### **TOPIC: 13 -FUNDAMENTAL PLANNING OF BUILDING:** [05]

13.01 Objects of fundamental planning, methods of determination of various room sizes, Anthropometric diagrams.

### **TOPIC: 14 -ARCHITECTURAL COMPOSITION:** [08]

14.01 General relationship of utility with beauty aesthetics. Architecture and fine arts. Elements of Architectural composition.

- |                      |                          |
|----------------------|--------------------------|
| - Points             | - Rythems                |
| - Lines              | - Contrast               |
| - Figures and planes | - Harmony                |
| - Forms              | - Character              |
| - Scale              | - Style                  |
| - Proportion         | - Materials & Structures |
| - Unity              | - Textures               |
| - Focus              | - Omamentations          |
| - Balance            | - Colours                |
| - Monotony           | - Light and Shades       |
|                      | - Truth                  |

### **TOPIC: 15 -SITE SELECTION AND ORIENTATION OF RESIDENTIAL BUILDINGS:** [08]

15.01 Site selection, Orientation of commercial buildings, Aims and procedures of orientation sun shading and climate control, source of heat, gain and loss, sun shading, solar control louvers, Ventilation and wind control, natural method of cooling. General Principle of flow of air.

#### **Books Recommended:**

1. Architectural composition and Design of Houses, Saral - J.D. Yadav  
Praksshan, Aligarh
2. Architecture - Talbot Hamlin
3. Town Planning - Rangwala
4. Town Planning & Architecture - Birdi

# RURAL ENGINEERING TECHNOLOGY

<b>Subject Code 15605D</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale :**

It is a known fact that approximately two third population of our country lives in villages. The development of our country depends on the development of the rural area. A civil engineering technician is required to acquaint himself/herself with all forms of rural problems and the technologies required to minimise the problems which in turn, will help development.

A civil engineering technician who is interested in rural development must be conversant with the rural planning, housing problems in rural area, problems of drinking water and sanitation, the technology involved in their rectification.

The subject is being introduced as an elective so that the interested students may increase his/her knowledge, understanding and skill in the field of rural development.

**Objective:**

After completion of the course, a student will be able to :

- Be conversant with the existing technological problems of the rural mass.
- Supervise all the rural construction works.
- Understand a rural problems.
- Plan, Design, supervise and guide the rural man in technical matter.
- Communicate with the rural artisans.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Rural Socio Economic Survey.	(18)
02	Rural Planning on Housing.	(14)
03	Rural Sanitation and water supply.	(12)
04	Rural Roads.	(04)
05	Rural Modern Technology.	(05)
06	Renewable sources of energy.	(04)
07	Preparation of Rural Project.	(03)
<b>Total :</b>		<b>(60)</b>

**CONTENTS:**

**TOPIC: 01 – RURAL SOCIO ECONOMIC SURVEY: [18]**

- 01.01 Preparation of Questionnaires.
- 01.02 Preparation of Formats.
- 01.03 Methodology of collecting data and place the same in survey questionnaires (Students should be assigned one neighbourhood village/Mohalla to collect data in a group of five).
- 01.04 Assessment and analysis of Survey Report.
- 01.05 Finding and Report Writing.

**TOPIC: 02 – RURAL PLANNING AND HOUSING: [14]**

- 02.01 Preparation of master plan on a given land–Survey report (Land survey report to be obtained from anchal).
- 02.02 Principle of Neighbourhood planning .
- 02.03 Essential needs of House Planning
- 02.04 Techniques on Low cost Housing with Locally available materials as per recommendations of N.B.O. C.B.R.I. and other organisations.

- 02.05 Methods of affecting improvements in the existing houses in respect of
- Ventilation.
  - Water Proofing.
  - Sanitation.

**TOPIC: 03 – RURAL SANITATION AND WATER SUPPLY:** [12]

- 03.01 Existing methods of water supply and sanitations.
- 03.02 Methods of conversion of dry latrines into pit Sanitary latrines.
- 03.03 Design and construction of different types of latrines for family size of 5 to 10 members.
- 03.04 Provision of potable water from
- Wells.
  - Tube wells.
  - Impounding Reservoirs.
- 03.05 Methods of Existing Water Supply Systems in Rural Area.
- 03.06 Improving drainage system in village .

**TOPIC: 04 – RURAL ROADS:** [04]

- 04.01 Study of Present road conditions and causes.
- 04.02 Techniques on construction of rural roads by soil stabilization.
- 04.03 Problems of rural roads and their remedial measures

**TOPIC: 05 – RURAL MODERN TECHNOLOGY:** [05]

- 05.01 Introduction, various facts of Rural Technology to suit different conditions in
- Agriculture.
  - Irrigation.
  - Grain Storage.
  - Transportation.
- 05.02 Ferro-cement Technology and its adoption in rural areas for construction of storage bins and water tanks.
- 05.03 Methods of manufacturing
- Lime
  - Bricks
  - Tiles in rural areas
- 05.04 Identification of problems in Minor irrigation works and their remedies.

**TOPIC: 06 – RENEWABLE SOURCES OF ENERGY:** [04]

- 06.01 Introduction to Renewable sources of Energy.
- 06.02 Construction and maintenance of Bio-gas Plant.
- 06.03 Uses of
- Solar Cooker.
  - Wind Mills.
  - Solar Water Heater.
  - Solar Water Battery Cells.

**TOPIC: 07 – PREPARATION OF RURAL PROJECT :** [03]

- 07.01 Collection of data
- 07.02 Different aspect of a rural project
- 07.03 Methods of Preparation of a Rural Project

**BOOKS AND JOURNALS:**

1. N.B.O. and C.B.R.I. Publications. -
2. Handouts of I.S.T. sponsored Seminars/Summer Schools /Winter Schools etc. -
3. Report on ministry of Rural Developments, Govt. of India. -
4. Indian Rural Problems - Nanawati and Angaria
5. Handouts of I.R.D.P. and D.R.D.A. -
6. Publications of CAPART and other Rural Organisations. -

# CONSTRUCTION, PLANNING & PROJECT MANAGEMENT

<b>Subject Code 15605E</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		<b>:</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>		<b>:</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>		<b>:</b>
					<b>100</b>	
					<b>80</b>	
					<b>20</b>	

## Rationale & Objective:

The construction industry plays a significant role in development of national economy. Almost half of the total outlay in any five year plan is utilized for construction activities which constitute an integral part of all development projects. During last four decades, the construction industry in India has undergone large scale mechanisation with rapid change and advancement in construction practices as well as in the management of construction work.

The term construction is no longer limited only to the physical activities involving men, materials and machinery but covers the entire gamuts of activities from conception to realization of a construction, project. The course will benefit the students who prefer to become professionals in construction planning & project management. The objectives of the course are to make students:

- Know the terms associated with the subject
- Understand the process of planning & Management
- Comprehend the importance of Inspection & Quality control
- Understand the methods of Inspection & Quality control in construction technology
- Know the causes of hazards so that he may take up all the steps to ensure safety in construction.
- Understand C.P.M. , P.E.R.T. methods of project Management

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Introduction of Construction planning & Management.	
02	Construction Planning.	
03	Construction Management.	
04	Inspection and quality control .	
05	Safety in Construction .	
06	Network Planning – CPM & PERT.	
<b>Total :</b>		<b>(60)</b>

## CONTENTS:

### TOPIC: 01 – INTRODUCTION TO CONSTRUCTION PLANNING AND MANAGEMENT:

- 01.01 Significance of Construction Management.
- 01.02 Objectives and Functions of Construction Management (Objectives and Functions).
- 01.03 Types of construction.
- 01.04 Resources for Construction Industry.
- 01.05 Stages in Construction.
- 01.06.01 Owner.
- 01.06.02 Engineers and Architect
- 01.06.03 Contractor.

**TOPIC: 02 – CONSTRUCTION PLANNING:**

- 02.01 Introduction to planning.
- 02.02 Stages of planning.
- 02.03 Scheduling.
- 02.03.01 Scheduling by Bar charts.
- 02.04 Preparation of materials, equipment, Labour and finance Schedule :
- 02.04.01 Preparation of Material Schedule.
- 02.04.02 Preparation of Labour schedule.
- 02.04.03 Preparation of Equipment (Machinery) schedule.
- 02.04.04 Preparation of finance schedule.
- 02.05 Limitation of Bar Chart

**TOPIC: 03 – CONSTRUCTION MANAGEMENT:**

- 03.01 Principles of Organisation.
- 03.02 Communication, leadership and Human Relations.
- 03.03 Types of Organisation :
- 03.03.01 Line Organisation
- 03.03.02 Line and staff organisations.
- 03.03.03 Functional organisation.
- 03.04 Organisation for a construction firm.
- 03.05 Site organisation :
- 03.05.01 Important Duties/Role of an Executive Engineer
- 03.05.02 Important Duties/Role of an Asstt. Engineer
- 03.05.03 Important Duties/Role of a junior Engineer
- 03.05.04 Role of Mistry/skilled worker.
- 03.05.05 Role of Labours.
- 03.05.06 Important Duties/Role of the project manager in construction firm.
- 03.06 Temporary services.
- 03.07 Job layout.
- 03.07.01 Purpose of layout.
- 03.07.02 Factors of fitting job layout.
- 03.07.03 Preparation of job layout.
- 03.08 Summary

**TOPIC: 04 – INSPECTION AND QUALITY CONTROL:**

- 04.01 Need for inspection and Quality Control.
- 04.02 Principles of Inspection.
- 04.03 Enforcement of specifications.
- 04.04 Stages of Inspection and quality control.
- 04.04.01 Earth work.

- 04.04.02 Masonary.
- 04.04.03 R.C.C.
- 04.04.04 Sanitary and water supply services.
- 04.04.05 Electrical Services.
- 04.05 Technical services and Inspection team.
- 04.06 Testing of structures.
- 04.06.01 Non-destructive Tests.
- 04.06.02 Full scale load test
- 04.06.03 Leak proof and dampness Test

**TOPIC: 05 – SAFETY IN CONSTRUCTION:**

- 05.01 Importance of safety.
- 05.02 Safety measures.
- 05.02.01 Safety measures for excavation.
- 05.02.02 Safety measures for Drilling and Blasting.
- 05.02.03 Safety measures for Hole Bituminous work.
- 05.02.04 Safety measures for scaffolding, ladders, form work and other equipments.
- 05.03 Fire safety.
- 05.03.01 Fire safety in buildings.
- 05.04 Safety campaign.
- 05.05 Summary.

**TOPIC: 06 –NETWORK PLANNING-CPM & PERT:**

- 06.01 Construction Management and Techniques
- 06.02 CPM.
- 06.03 PERT

**Books Recommended:**

- |   |                    |
|---|--------------------|
| 1. Construction Planning & Management.        | - Elliof & Gambhir |
| 2. Construction Planning & Management         | - Shree Nath       |
| 3. Construction Planning & Management         | - Puriboy          |
| 4. Construction Management & A/C              | - Harpal Singh     |
| 5. Construction Management & A/C              | - Vazirani         |
| 6. Construction Management & A/C              | - J.L. Sharma      |
| 7. Construction Management & A/C              | - Agarwal          |
| 8. Project Planning & Control with PERT & CPM | - Punamia          |
| 9. CPM & PERT                                 | - Srinath          |
| 10. Construction Planning & Equipment         | - By Satnarayan    |
| 11. Construction Planning & Management        | - M .Verma         |
| 12. कन्स्ट्रक्शन मैनेजमेंट एवं एकाइजंट        | . बी0 एल0 गुप्ता   |
| 13. निर्माण प्रबंध एवं श्रम संबंधक            | . जे0 झा0          |
| 14. Project Management and P.W.D. code        | -                  |
| 15. Construction Management                   | - T.T.T.I. Madras  |



## CONSTRUCTION PRACTICE LAB - II

<b>Subject Code 15606</b>	<b>Practical</b>			<b>No of Period in one session : 60</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>Annual Exam.</b>	<b>:</b>	<b>40</b>
	<b>-</b>	<b>-</b>	<b>04</b>	<b>Internal Exam.</b>	<b>:</b>	<b>10</b>

### Rationale & Objective :

Civil Engineering technician has to work as construction supervisor in the field. He should have knowledge of and skill to inspect site works and machine i.e. concrete, vibrator for compaction etc. He is required to be technically sound, confident and cost conscious. So, the construction practical is very important for a Civil Engineer.

The objectives of model mix, rod bending, casting, preparation of surfaces, flooring etc.

List of Construction Practical (Any six out of following):-

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Preparation of model form work for (a) R. C. C. Beam (b) R.C.C. Slab (c) R.C.C. Column	
02	Bending, Binding and placing re-inforcement into the form work for (Any two of following):- (a) R.C.C. beam (b) R.C.C. Slab (c) R.C.C. Column (d) An isolated column tooling (e) Lintel with sun shade.	
03	Preparation of concrete mix in required proportion having a given slump by manual, by concrete mixer and casting a miniature R.C.C. member compaction by compaction rod by vibrator and curing.	
04	Preparation of surface for I.P.S. Flooring, laying, cutting and finishing for at least 1 square meter area.	
05	Construction of water bond macadam road (box cutting providing requisite chamber, brick paying & brick edging only in the form of model work.	
06	Study of water supply and sanitary fittings works.	
07	Study of fitting and fining of doors & windows.	

### Books Recommended:

1. Bhawan Nirman Technology.	- B.L. Gupta
2. Bhawan Nirman Takniki.	- Gur Charan Singh
3. Building Construction.	- Sushil Kumar
4. Construction Technology.	- S.C. Rangwala
5. Building Construction.	- Ahuja
6. Hand Book of Building Engg., N.B.O. (Delhi).	-
7. Indian Standard Codes (Relevant).	-

# ENVIRONMENTAL ENGINEERING LAB

<b>Subject Code</b> <b>15607</b>	<b>Practical</b>			<b>No of Period in one session : 50</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>Annual Exam.</b>	<b>:</b>	<b>40</b>
	<b>-</b>	<b>-</b>	<b>4</b>	<b>Internal Exam.</b>	<b>:</b>	<b>10</b>

**Rationale:**

Environment is the integral part of life. It consists of biotic and abiotic things. There should be a proper balance between biotic and abiotic things to maintain ecological balance. Man has exploited the environment which has hampered this ecological balance which leads to environmental degradation. The population explosion and affluent society which desires for a vast array of products, increased radiation, the automobile, greater energy use, increased food production needs and other developments have created strains on parts of the ecological system. At present, entire cultural history, man is facing one of the most horrible ecological crises- the problem of pollution of his environment which sometimes in past was pure, virgin, undisturbed, uncontaminated and basically quite hospitable for him.

Hence there is a need to study the problems related to environment in general and water pollution, land pollution, air pollution, solid waste management and noise pollution etc.; in particular.

**Objectives:**

The students will be able to –

- 1) Estimate water demands
- 2) Analyse the quality of water
- 3) Suggest the treatment required by knowing the quality of water
- 4) Know the sewerage system.
- 5) Analyse the sewage
- 6) Suggest the waste water treatment
- 7) Suggest the treatment for industrial waste
- 8) Know the solid waste management

**Practical:**

Skills to be developed:

Intellectual Skills:

1. Identify the method for testing of water.
2. Interpret the results.

Motor Skills:

1. Observe chemical reactions
2. Handle instruments carefully

**List of Practical:**

**Water Supply Engineering:**

- 1) To determine fluoride concentration in given water sample
- 2) To determine the turbidity of the given sample of water.
- 3) To determine residual chlorine in a given sample of water.
- 4) To determine suspended solids, dissolved solids, and total solids of water sample
- 5) To determine the dissolved oxygen in a sample of water.
- 6) To determine the optimum dose of coagulant in the given sample by jar test.

**Sanitary Engineering:**

- 1) To determine the dissolved Oxygen in a sample of waste water.
- 2) To determine B.O.D. of given sample of waste water.
- 3) To determine C.O.D. of given sample of waste water.
- 4) To determine suspended solids, dissolved solids and total solids of waste water sample.
- 5) Design the Septic Tank for the public building such as hostel or hospital. Draw Plan and Section of the same along with the drainage arrangement in soak pit.
- 6) To determine various pollutant levels in the atmosphere using Digital Air Volume Sampler.
  - a) Energy generation plants from solid wastes.
  - b) Energy generation plants from Gobar Gas.

**Reference Books:**

<b>Sl. No.</b>	<b>Author</b>	<b>Title</b>	<b>Publisher</b>
1.	Santosh Garg	Environmental Engineering (Volume I & II )	Khanna Publishers,
2.	Kamla A. & Kanth Rao D. L.	Environmental Engineering	Tata McGraw Hill
3.	Birdie G. S. Birdie J. S.	Water Supply and Sanitary Engineering	Dhanpat Rai & Sons
4.	Deolalikar S. G.	04 Plumbing – Design and Practice	Tata McGraw Hill,
5.	Rao M. N. Rao H. V. N.	Air Pollution	Tata McGraw Hill
6.	H. M. Raghunath	Ground Water	New Age International
7.	Rao & Dutta	Industrial Water Treatment	

## PROFESSIONAL STUDIES & ENTREPRENEURSHIP

<b>Subject Code</b> <b>00607</b>	<b>Sessional</b>			<b>No of Period in one session : 50</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>Annual Exam.</b>	<b>:</b>	<b>30</b>
	<b>-</b>	<b>-</b>	<b>04</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

### Rationale:

The paper has been introduced to achieve dual purpose for the students.

Firstly, this course provides the basics of Professional management and secondly it also prepares the student to undertake independent venture by becoming an entrepreneur.

This makes them conversant with their duties and responsibility to make them successful in their career building.

### Objectives:

With the input provided in this paper, the students will be able to :-

- Acquire basic knowledge of management.
- Understand the area of management such as human resources, marketing, finance and commercial aspect.
- Understand the benefit of becoming an entrepreneur.
- Handle a project efficiently and in dependently.

**To prepare a Project Report on any of the followings:**

<u>S.No.</u>	<u>Topics</u>
01	Project Identification and formulation Report.
02	Project Profile/Pre-feasibility Report.
03	Techno-economical Feasibility Report (TEFR).
04	Market Survey Report.

### CONTENTS

<u>S.NO.</u>	<u>TOPICS</u>
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#### TOPIC – 01 : PROJECT IDENTIFICATION AND FORMULATION REPORT:

- ◆ Introduction.
- ◆ Collection of Data.
- ◆ Compilation of Data.
- ◆ Analysis and Assimilation of Data.
- ◆ Product Selection.
- ◆ Report Finalisation and Report Writing.

#### TOPIC - 02 : PROJECT PROFILE/PRE-FEASIBILITY REPORT :

- ◆ Introduction of the product.
- ◆ Market.
- ◆ Man Power (Personnel Required).
- ◆ Manufacturing Process.
- ◆ Plant and Machinery.

- ◆ Cost of Project.
- ◆ Means of Finance.
- ◆ Cost of Production.
- ◆ Annual Turnover.
- ◆ Profit.
- ◆ Profit on Investment.

**TOPIC – 03: TECHNO-ECONOMICAL FEASIBILITY REPORT (TEFR).**

- ◆ Introduction on product.
- ◆ Market Prospects and Marketing.
- ◆ Location.
- ◆ Manufacturing Programme and Annual Turnover.
- ◆ Manufacturing Process.
- ◆ Cost of Project.
- ◆ Means of Finance.
- ◆ Requirement of Raw materials, Consumables, Utilities and Working Capital.
- ◆ Organisational Structure, Management and Man Power.
- ◆ Project Implementation Schedule.
- ◆ Profitability and Cash Flow.

**TOPIC - 04 : MARKET SURVEY REPORT:**

- ◆ Data Collection & Processing through Primary & Secondary Sources- Questionnaire method, e-mail, by post, by phone.
- ◆ Present Status.
- ◆ Growth of the Industry.
- ◆ Import and Export.
- ◆ Present market Demand.
- ◆ Forecast.
- ◆ Future Prospect/Scope.
- ◆ Market Segmentation.

**Books Recommended:**

1. Essential of Management, Tata McGraw Hill, - Herald Koonz & Cyril O' Donnel. Publishing Company Ltd., New Delhi.
2. Business Organisation and Management, S. C. Chand - M. C. Shukla and Company (Pvt.) Ltd., Ram Nagar, New Delhi
3. Managerial Economics, Sultan Chand & Sons, New - R. L. Vashney & K. L. Maheshwari Delhi
4. Project Appraisal and Follow up, Govind Prakashan, - D. P. Sharda Mumbai.

5. Modern Marketing Management, Progressive Corporation Pvt. Ltd., P51, Mahatma Gandhi Road, Bombay-400 001 - Dr. Rustam S. Davar
6. A hand book for new entrepreneurs (with special reference to science and technology target group) - Entrepreneurship Development Institute of India, 83-A, Swastic Society Navrangpura, Ahmedabad, PIN-380 009.
7. Student discipline - Published by I.S.T.E. Mysore
8. Communication Skill - Published by I.S.T.E. Mysore
9. Decision Making - Published by I.S.T.E. Mysore
10. Pollution Control in Industry - Published by I.S.T.E. Mysore
11. S.S.M. in Environmental Engineering - Published by I.S.T.E. Mysore
12. Leadership in Organisation - Published by I.S.T.E. Mysore
13. Small Enterprise Management - Published by I.S.T.E. Mysore
14. Motivation - Published by I.S.T.E. Mysore
15. Fundamentals of Environmental Pollution - Krishnan and Kannan
16. Enviromental Engineering, T.T.T.I., Madras - Tata Mcgraw Hill
17. Motivation I.I.T. Kanpur - Published by I.S.T.E. Mysore
18. Mine Management - V.N. Singh, Bangle Prining Press Ranchi
19. Hand book on Project Appraisal and follow up, Govind Prakashan, 204, Saraswati Kunj, 90, S. V. Road, Goregoan, Bombay-400 062. - D. P. Sarda
20. Bihar Industrial Policy - Government of Bihar, Department of Industries.
21. Entrepreneurship Guide - Bihar State Financial Corporation, Fraser Road, Patna-800 001.
22. Management Economics, S. Chand & Sons, 4792/23, Dariaganj, New Delhi-110 002. - R. L. Varshney & G. L. Maheshwari
23. Management Principles & Practices, S. Chand & Sons, 4792/23, Dariaganj, New Delhi-110002. - L. Prasad & S. S. Gulshan

# PROJECT WORK AND ITS PRESENTATION IN SEMINAR

<b>Subject Code 15609</b>	<b>Sessional</b>			<b>No of Period in one session :</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>60</b>
	<b>-</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>40</b>

**Rationale :**

Projects are intended to provide students with an ability to tackle new problems with inquisitiveness. The project is included in the course to develop skill to plan, organize, conduct survey, investigate, collect relevant course and will also provided an opportunity to develop skill to integrate knowledge and skill gained while going through other subjects.

**Objective:**

The students will be able to develop skill to :

- Plan.
- Organise.
- Conduct survey.
- Investigate.
- Collect relevant data.
- Take decision.
- Prepare a project or technical report.
- Present the report before a seminar.

<u>S.No.</u>	<u>Topics</u>
01	Road project.
02	Other project.

**CONTENTS**

**TOPIC: 01- ROAD PROJECT :**

01.01            ½ Kilometer length :  
The road project will be allotted to the student by the faculty in charge of the project.

**TOPIC 02 : -OTHER PROJECT (ANY ONE FROM THE FOLLOWING) :**

- 02.01            Bridge Project (S. L. R. bridge).
- 02.02            Irrigation project (Barrage project/Dam project/Canal project Tube well project).
- 02.03            Drainage project (one colony / command of one outlet/ small chour 100 hectares).
- 02.04            Water supply scheme – one colony (minimum ten houses).
- 02.05            Sanitary engineering scheme one colony (minimum ten houses).

The above mentioned Project Report will include the following :

1. Location survey.
2. Reconnaissance survey.
3. Investigation & survey work.
4. Design and Office work (generally based on studies in theory subjects. (In case of design work beyond the syllabus.).
5. Preparing working drawing, estimating materials, Drawing section, layout plans, Schematic diagrams plans and elevations, other details.
6. Estimating and counting.
7. Construction planning.
8. Technical Project Report.

Project work/ project report should be presented in the form of a seminar for developing confidence and communication skill among the students.

**NOTE:-**

For completion of Project Work a duration of two weeks at a stretch will be provided.

Project work will be allotted to the students just in the beginning of the session. Each student will be given a separate work under the supervision of a teacher. Total number of students may be divided among the number of teachers available. The teacher concerned will select separate problem for each student under him and allot it to him at the beginning of the session. Problems selected should preferably conform to the syllabus. If it is outside of the syllabus then it must be within the field of Civil engineering.

**References:**

1. I. S. codes and manuals.
2. Text Books of concerned subjects.