

FIFTH SEMESTER

CE – 530 Civil Engineering Drawing – II

CM - 531 Generic skills and Entrepreneurship development CE –
532 RCC Design

CE – 533 Application and uses of various software in Civil Engineering CE -
534 Practical Training

CE 530 CIVIL ENGINEERING DRAWING - II

	L	T	P
Pds/week	2	-	6

Note:

For all the drawings detailed specifications shall be given.

Designs are not to be included in the examinations.

The drawings must include layout plans, Plan, sections, details of components, elevation, etc., as applicable to each topic.

Preparation of bar bending schedules in respect of RCC drawings shall be encouraged.

There are Two Groups of drawings that are to be taught. The question paper will include three questions from group A and three questions from group B with due weight age given to each group.

Students shall be asked to attempt one question from each group.

Group 'A'

(50 %)

1. Detail of standard accessories in a toilet and drainage plan of a building.
2. One pipe and two pipe system.
3. Manhole: circular and Rectangular.
4. Septic tank and soak pit.
5. Drainage scheme of the residential building on given single line plan.

Group 'B'

(50 %)

1. Simply supported one-wayslab.
2. Simply supported two-wayslab.
3. Restrained two-way slab.
4. Cantilever Beam, Singly and Doubly reinforced beams
5. Tee Beams and continuous slab.
7. Dog-legged staircase.
8. RCC column and Footing

REFERENCE BOOKS:

1. Drawing manual - T.T.T.I – Chand & Co.
 2. Structural Drawing and Detailing - Krishnamoorthy
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CE533 COMPUTER APPLICATION IN CIVIL ENGINEERING

	L	T	P
Pds/week	-	-	4

RATIONALE

Computer applications plays a very vital role in present day life and more so, in the professional life of diploma engineer. In order to enable the students use the computers effectively in problem solving, this course offers applications of various computer softwares in civilengineering.

DETAILED CONTENTS

PRACTICAL EXERCISES

- I. Introduction and use of AutoCAD for making 2D Drawings and develop plan, section and elevation of 2 rooms building, RCC beam, slab, column, footing and plumbing and sewer drainage drawing.
- I. Demonstration of various civil engineering softwares like STAAD-Pro, ETAB, MS Project or Primavera Project Planner, Auto Civil, MX Road or any other equivalent software for above mentioned software

Note:

- i) The polytechnics may use any other software available with them for performing these exercises
 - ii) If the above softwares are not available in the institution, the demonstration of the above said software should be arranged outside the institute.
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	L	T	P
Pds/week	4	-	-

RATIONALE

Generic Skills and Entrepreneurship Development is one of the courses from “Human Science” subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aim at developing conceptual understanding for setting-up one’s own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager.

Both the subject areas are supplementary to each other and soft skills are required to be developed in diploma passouts for enhancing their employability and self confidence.

DETAILED CONTENTS

1. Introduction to Generic Skills (10%)

Importance of Generic Skill Development (GSD)
 Global and Local Scenario of GSD
 Life Long Learning (LLL) and associated importance of GSD.

2. Managing Self (20%)

Knowing Self for SelfDevelopment

- Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.

Managing Self - Physical

- Personal grooming, Health, Hygiene, Time Management

Managing Self – Intellectual development

- Information Search: Sources of information
- Listening: Effective Listening
- Speaking: Effective Oral Communication
- Reading: Purpose of reading, different styles of reading, techniques of systematic reading; Note Taking: Importance and techniques of note taking
- Writing: Correspondence - personal and business

Note: Practical sessions should be coupled with teaching of effective listening, speaking, reading and writing.

Managing Self –Psychological

- Stress, Emotions, Anxiety-concepts and significance (Exercises related to stress management)
- Techniques to manage the above

3. Managing in Team (10%)

Team - definition, hierarchy, team dynamics

Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background

Communication in group - conversation and listening skills

4 Task Management (10%)

Task Initiation, Task Planning, Task execution, Task close out

Exercises/case studies on task planning towards development of skills for task management

5. Problem Solving (10%)

Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving

Different approaches for problem solving.

Steps followed in problem solving.

Exercises/case studies on problem solving.

6. Entrepreneurship

Introduction (40%)

- Concept/Meaning and its need
- Competencies/qualities of an entrepreneur
- Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.

Market Survey and Opportunity Identification (Business Planning)

- How to start a small scale industry
- Procedures for registration of small-scale industry
- List of items reserved for exclusive manufacture in small-scale industry
- Assessment of demand and supply in potential areas of growth.
- Understanding business opportunity

- Considerations in product selection
- Data collection for setting up small ventures.

Project Report Preparation

- Preliminary Project Report
- Techno-Economic Feasibility Report
- Exercises on Preparation of Project Report in a group of 3-4 students
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INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. Some of the topics may be taught using question answer, assignment, case studies or seminar. In addition, expert lectures may be arranged from within the institution or from management organizations. Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also. The students may also be provided relevant text material and handouts.

RECOMMENDED BOOKS

1. Soft Skills for Interpersonal Communication by S. Balasubramaniam; Published by Orient BlackSwan, New Delhi
2. Generic skill Development Manual, MSBTE, Mumbai.
3. Lifelong learning, Policy Brief (www.oecd.org)
4. Lifelong learning in Global Knowledge Economy, Challenge for Developing Countries – World Bank Publication
5. Towards Knowledge Society, UNESCO Paris Publication
6. Your Personal Pinnacle of Success by DD Sharma, Sultan Chand and Sons, New Delhi
7. Human Learning, Ormrod
8. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
9. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
10. Handbook of Small Scale Industry by PM Bhandari

CE532 RCC DESIGN

	L	T	P
Pds/week	4	-	-

RATIONALE

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise RC Construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials (bars of different diameters). This subject thus deals with elementary design principles as per IS:456-2000

DETAILED CONTENTS

- I. Introduction (5%)
 - Concept of Reinforced Cement Concrete(RCC)
 - Reinforcement Materials:
 - Suitability of steel as reinforcing material
 - Properties of mild steel and HYSD steel
 - I.3. Loading on structures as per IS: 875
2. Introduction to following methods of RCC design (5%)
 - Working stress method
 - Limit state method
3. Shear and Development Length (5%)
 - Shear as per IS:456-2000 by working stress method
 - i) Shear strength of concrete without shear reinforcement
 - ii) Maximum shear stress
 - iii) Shear reinforcement
4. Singly Reinforced Beam (Working stress method) (10%)
 - Basic assumptions and stress strain curve, neutral axis, balanced, under-reinforcement and over reinforced beams, Moment of resistance for singly reinforced beam.
 - Design of singly reinforced beam including sketches showing reinforcement details.
5. Concept of LimitState Method (5%)

Definitions and assumptions made in limit state of collapse (flexure)
Partial factor of safety for materials
Partial factor of safety for loads
Design loads
Stress block, parameters

6. Singly Reinforced beam (10%)

Theory and design of singly reinforced beam by Limit State Method

7. Doubly Reinforced Beams (10%)

Theory and design of simply supported doubly reinforced rectangular beam by Limit State Method

8. Behaviour of T beam, inverted T beam, isolated T beam and 'L' beams (No Numericals) (5%)

9. One Way Slab (10%)

Theory and design of simply supported one way slab including sketches showing reinforcement details (plan and section) by Limit State Method..

10. Two Way Slab (5%)

Theory and design of two-way simply supported slab with corners free to lift, no provisions for torsional reinforcement by Limit State Method including sketches showing reinforcement details (plan and two sections) (No Numericals)

11. Axially Loaded Column (10%)

Definition and classification of columns

Effective length of column,

Specifications for longitudinal and lateral reinforcement

Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement (sectional elevation and plan)

12. STAIRCASES BY L.S.M. (5%)

Structural behavior of stairs, effective span of stairs, estimation and distribution of loads, effective breadth of flights, design of cantilever steps, design of doglegged and open well stairs spanning parallel to the flight. ** Design of stair-case not for exam

13. DESIGN OF COLUMN FOOTINGS by L.S.M.

(10 %)

Types of RCC footings, Footings with uniform thickness and sloped footings – minimum thickness – critical sections – minimum reinforcement, distribution of reinforcement, development length, cover, minimum edge thickness requirements as per IS 456 – 2000. Only design of isolated footing (square and rectangular) with uniform thickness is to be asked.

14. Prestressed Concrete (No Numericals) (5%)

- a) Concept of pre-stressed concrete
- b) Methods of pre-stressing : pre-tensioning and post tensioning
- c) Advantages and disadvantages of prestressing
- d) Losses in pre-stress

Important Note: Use of BIS:456-2000 is permitted in the examination.

INSTRUCTIONAL STRATEGY

Teachers are expected to give simple problems for designing various RCC structural members. For creating comprehension of the subject, teachers may prepare tutorial sheets, which may be given to the students for solving. It would be advantageous if students are taken at construction site to show form work for RCC as well as placement of reinforcement in various structural members. Commentary on BIS:456 may be referred along with code for relevant clauses.

RECOMMENDED BOOKS

1. Punmia, BC; "Reinforced Concrete Structure Vol I", Standard Publishers, Delhi
2. Ramamurtham, S; "Design and Testing of Reinforced Structures", Dhanpat Rai and Sons, Delhi
3. Gambhir, M.L., "Reinforced Concrete Design", Macmillan India Limited
4. Singh, Birinder "RCC Design and Drawing", Kaption Publishing House, New Delhi
5. Singh Harbhajan "Design of Reinforced Concrete Structure Design" Abhishek Publishers Ltd., Chandigarh
6. Mallick, SK; and Gupta, AP; "Reinforced Concrete", Oxford and IBH Publishing Co, New Delhi.
6. Singh Harbhajan, Limit Stat of RCC Design"; Abhishek Publishers Ltd.

CE 534 PRACTICAL TRAINING
(Including field Visits/Exposure and Practice on Computers)

	L	T	P
Pds/week	-	-	16

The object of this training is to:

- i). Most of the Civil Engineering works are executed through contracts and with reference to relevant code practices, technical specification hence exposure of the students to industrial/field procedures and practices will give due focus in sensitizing the students about these aspects so that the student is able to properly comprehend, apply & understand the implications..
- ii). Develop comprehension regarding concepts, principles and practices taught in the class room in their application in solving field/industrial tasks/problems. For this purpose, students are required to be sent for a period of 8-9 weeks for practical training in field/industry.

For effective planning and implementation of this training, it is proposed to:

- i) Identify adequate number of industrial/field organizations where students will be sent for practical training.
- ii) Prepare a work book, which can be used by students for guiding students to perform definite task during practical training.
- iii) Identification of teachers who would supervise the students and provide guidance during practical training.

Each student is supposed to prepare a detailed report of the operations/processes seen by him/her. The students should be guided by respective subject teacher. Each teacher may guide a group of four to five students. The teacher along with person from the Industry will conduct performance assessment of the students. The criteria of the assessment will be as follows:

<u>Criteria</u>	<u>Weightage</u>
i) Attendance and Punctuality	15%
ii) Initiative in performing task/learning new things	15%
iii) Relations with people	15%
IV) Report writing	55%

Note: Out of the Eight-Nine weeks training (including 3-4 weeks training during

vacations)in the industry/field about two weeks may be spent by the students along with the teachers in visits to various organizations dealing with civil Engineering

CE540 CONTRACT LAWS AND REGULATIONS

	L	T	P
Pds/week	4	-	-
1. CONSTRUCTION CONTRACTS	(20%)		
Indian Contracts Act-Essential elements of Contracts-Types of contracts-Features: Suitability, advantages and disadvantages – Documents: Standard contract Document.			
2. TENDERS	(20%)		
Definitions, tender notice, Prequalification, Bidding, Accepting, Evaluation of Tender from Technical, Contractual and commercial points of view, acceptance of tender, contract formation and interpretation-Potential contractual problems			
3. ARBITRATION	(20%)		
Need of arbitration, Arbitration Act, Types of arbitration, Procedure for settlement of disputes including arbitration award. Agreements, subject matter, Violations, Powers and duties of Arbitrator, Rules of Evidence.			
4. LEGAL REQUIREMENTS	(20%)		
Insurance and Bonding Laws. Taxation Laws: Sale Tax, Income Tax, Excise and customs duties and their influence on construction costs. Agency Law,			
5. LABOUR REGULATION	(20%)		
Necessity, Aims and objectives,(Social Security-Welfare Legislation) Statutory Regulations: Workman compensation act, minimum wages act, ESI act, EPF act, Payment of wages act, Bonus and Industrial Disputes.			

References:

1. Gajaria G.T., " Laws Relating to Building and Engineering Contracts in India ", M.M.Tripathi Private Ltd., Bombay, 1982.
 2. Jimmie Hinze, " Construction Contracts ", 2nd Edition, McGraw Hill, 2001.
 3. Joseph T. Bockrath, " Contracts and the Legal Environment for Engineers and Architects ", 6th Edition, McGraw Hill, 2000.
 4. Chakraborti.M, "Estimating , Costing Specification and Valuation in Civil Engg"
 5. Datta.B.N., "Estimating and Costing in Civil Engg" UBS Publishers (P) ltd. Delhi.
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CE54I RAILWAY, BRIDGES AND TUNNELS

	L	T	P
Pds/week	4	-	-

RATIONALE

This subject will cater to the needs of those technicians who would like to find employment in the construction of railways, bridges and tunnels. The subject aims at providing broad based knowledge regarding track materials, fixtures and fasteners; geometrics of broad gauge; points and crossings; track laying procedure, track maintenance; classification of bridges, site selection, bridge foundations, piers and abutments, bridge bearings, temporary bridges, maintenance of bridges and various aspect of tunnel construction.

NOTE: Weightage of each topic for external examination is given in the brackets (NO Numericals)

DETAILED CONTENTS

PART – I: RAILWAYS

(40%)

1. Introduction to Indian Railways

2. Railway surveys: Factors influencing the railways route, brief description of various types of railway survey

3. Classification of permanent way describing its component parts

4. Rail Gauge: Definition, types, practice in India

5. Rails – types of rails

6. Rail Fastenings: Rail joints, types of rail joints, fastenings for rails, fish plates, bearing plates

7. Sleepers: Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers.

8. Ballast: Function of ballast, requirements of an ideal material for ballast

9. Crossings and signalings: Brief description regarding different types of crossings/ signalings (Latest electronics operated signal devices)

10. Maintenance of track: Necessity, maintenance of track, inspection of soil, track and fixtures; maintenance and boxing of ballast maintenance gauges, tools

11. Earth work and drainage: Features of rail road, bed level, width of formation, side slopes, drains, methods of construction, requirement of drainage system

PART-II: BRIDGES

(40%)

12. Introduction Bridge – its function and component parts, difference between a bridge and a culvert

13. Classification of Bridges

Their structural elements and suitability:

According to life – permanent and temporary

According to deck level – Deck, through and semi-through

According to material – timber, masonry, steel, RCC, pre-stressed

According to structural form; - Grade Separators - Railway Overbridges (ROB), Railway underbridge (RUB)

- Beam type – RCC, T-Beam, steel girder bridges, plate girder and box girder, balanced cantilever, Trussed bridges.

- Arch type – open spandrel and filled spandrel barrel and rib type - Suspension type – unstiffened and stiffened and table (its description with sketches) - According to the position of highest flood level submersible and non submersible

IRC classification

14. Bridge Foundations: Introduction to open foundation, pile foundation, well foundation

15. Piers, Abutments and Wingwalls

Piers – definition, parts; types – solid (masonry and RCC), open

Abutments and wing walls – definition, types of abutments (straight and tee),

abutment with wing walls (straight, splayed, return and curved)

Launching of Equipment Bridges

16. Bridge bearings

Purpose of bearings; types of bearings – fixed plate, rocker and roller.

17. Maintenance of Bridges

Inspection of Steel and Equipment bridges

Routine maintenance

PART - III: TUNNELS

(20%)

18. Definition and necessity of tunnels

19. Typical section of tunnels for a national highway and single and double broad gauge railway track

20. Ventilation – necessity and methods of ventilation, by blowing, exhaust and combination of blowing and exhaust

21. Drainage method of draining water in tunnels

22. Lighting of tunnels

Notes: i) Field visits may be organized to Bridge construction site or a Bridge/Tunnel construction site/Railways tracks to explain the various components and a field visit report shall be prepared by the students, as teamwork

ii) Examiners should set questions from all the parts

INSTRUCTIONAL STRATEGY

This subject is of practical nature. While imparting instructions, teachers are expected to organize demonstrations and field visits to show various components and construction of

railway track, bridges and tunnel.

RECOMMENDED BOOKS

1. Vaswani, NK, "Railway Engineering", Publishing House, Roorkee
2. Rangwala, SC, "Railway Engineering", Anand, Charotar Book Stall
3. Deshpande, R, "A Text Book of Railway Engineering", Poonam United Book Corporation
4. Algia, JS "Bridge Engineering", Anand, Charotar Book Stall
5. Victor Johnson, "Essentials of Bridge Engineering" Oxford and IBH, Delhi
6. Rangwala S.C., "Bridge Engineering", Anand, Charotar Book Stall
7. IRC Bridge Codes

CE 542 INDUSTRIAL WASTETREATMENT

L T P

Pds/week 4 - -

INTRODUCTION

Effects of Industrial Wastes on streams, land, Air and Waste Water Treatment plants, Water Quality Criteria, Effluent Standards: Process Modification, Methods and Materials changes, House keeping etc., to reduce waste discharges, and Strength of the waste and established recovery and reuse methods for by products within the plant operations.

NOTE: Weightage of each topic for external examination is given in the brackets.

Characterization of major Industrial wastes (liquid wastes) and detailed treatment methods for different types of industries.

(15%)

CHEMICAL INDUSTRIES: Petro chemicals and refineries, Pharmaceuticals. (10%)

APPAREL INDUSTRIES: Textiles, synthetic Fibers, leather, paper. (10%)

AGROINDUSTRIES: Fertilizer. (5%)

FOOD INDUSTRIES: Meat packing, pickles, canning, poultry, Distilleries, Sugar, Dairy. (10%)

METALLURGICAL INDUSTRIES: (10%)

Steel plants, Mines, Non-Ferrous metal industries and collieries.

POWER INDUSTRIES: Thermal Power station, Nuclear Power plants.

(10%)

RADIO ACTIVE INDUSTRY: Conventional methods of Treatment and disposal of Industrial wastes. Equalization and Neutralization, sedimentation and filtration.

(10%)

REMOVAL OF ORGANIC CONTENTS: Biological Treatment method, Aerobic Digestion and Anaerobic Digestion - Trickling filters, stabilization ponds, activation sludge process – oxidation ditch. (5%)

REMOVAL OF INORGANIC DISSOLVED SOLIDS: Evaporation, Dialysis, Ion exchange, Miscellaneous methods.

(5%)

PHYSICO - CHEMICAL TREATMENT METHODS: Neutralization, Coagulation,

Flocculation, Adsorptions, Absorption and precipitation. Combined Treatment of Industrial and Municipal Wastes.

(10%)

REFERENCES:

1. Theories and Practices of Industrial Waste Treatment Nemerow-N.L.
2. Principles of Industrial Waste Treatment – Gurnham C.F.
3. Treatment and Disposal of Industrial Waters. – Southgate

CE 543 ANALYSIS OF STRUCTURES

	L	T	P
Pds/week	4	-	-
1. SLOPE AND DEFLECTION OF BEAMS			(15 %)
<p>Deflected shapes of beams with different support conditions – Flexural rigidity and stiffness of beams – Derivation of differential equation of flexure – Area moment method – Mohr’s theorem for slope and deflection of beams – Derivation of expressions for maximum slope and maximum deflection of simple standard cases by area moment method for cantilever and simply supported beams subjected to symmetrical UDL & point loads – Numerical problems on slope & deflections at salient points from first principles – simple problems.</p>			
2. PROPPED CANTILEVERS AND FIXED BEAMS			(20 %)
<p>Definition of Prop – Statically indeterminacy – Prop reaction from deflection consideration – SF & BM diagrams by area moment method for UDL throughout span, central and non-central.</p> <p>Introduction to fixed beam – sagging & hogging bending moments – Determination of fixing moments by area moment method – standard cases – Fixed beams subjected to symmetrical & unsymmetrical concentrated loads and UDL – SF & BM diagrams for supports at the same level (sinking of supports at different levels not included) – slope and deflection of fixed beams. Subjected to symmetrical UDL & concentrated loads by area moment method only – Problems.</p>			
3. CONTINUOUS BEAMS – THEOREM OF THREE MOMENTS			(15 %)
<p>Introduction – Definition of indeterminate structures – General methods of analysis of indeterminate structures – Clapeyron’s theorem of three moments – statement – Application of Clapeyron’s theorem of three moments for the following cases – Problems on two span – simply supported ends – one end fixed and the other simply supported – simply supported with one end overhanging – Propped cantilever – sketching of SFD & BMD for the above cases.</p>			
4. CONTINUOUS BEAMS – MOMENT DISTRIBUTION METHOD			(15 %)
<p>Introduction – sign conventions – stiffness factor – carry over factor – Distribution factor – Application to continuous beams upto three spans & propped cantilever – Problems – Portal frames symmetrical frames only (no sway correction) – sketching BMD only for beams and frames.</p>			
5. MASONRY DAMS			(20 %)
<p>Introduction – derivation for maximum and minimum stresses – stress distribution diagrams – Problems – Factors affecting stability of masonry dams – factor of safety problems on stability – minimum base width & maximum height for no tension – Elementary profile of a dam – Minimum base width of elementary profile for no tension.</p>			
6. EARTH PRESSURE AND RETAINING WALLS			(15 %)
<p>Definition – Angle of repose – state of equilibrium of soil – Active and passive earth pressure – Rankine’s theory of earth pressure – Assumptions – lateral earth</p>			

pressure with level back fill – level surcharge – earth pressure due to soils – Retaining walls with vertical back only – maximum and minimum stresses – stress distribution diagrams – problems – stability of earth retaining walls – problems to check stability.

Reference Books:

1. Theory of structures by S. Ramamrutham
2. Theory of structures by B.C. Punmia, Ashok Jain & Arun Jain
3. Mechanics of structures (Vol.I) by S.B. Junnarkar
4. Analysis of structures by V.N. Vazirani & M.M. Ratwani
5. Elementary theory of structures by R.L. Jindal
6. Strength of materials by F.V. Warnock

CE-544 ECOLOGY & ENVIRONMENTAL CHEMISTRY

	L	T	P
Pds/week	4	-	-

RATIONALE

The Diploma holders are supposed to have basic knowledge about ecology , environmental chemistry so that they can comprehend the various subjects. Hence this subject.

Note :- Weightage of each topic for external examination is given in the brackets.

DETAILED CONTENTS

1.0 Ecology (40%)

Basic definition of Ecology . The Scope of Ecology . Eco system , Component of the Ecosystem,
Major Ecosystems –Pond , Forest, Desert, Lake, Streams, River, and Estuaries .

Types of Ecosystem

Energy Flow Within the Ecosystem - Energy and Materials , The Solar Radiations Environment.

Food Chains And Tropic level , Grazing and Detritus Food chains , Primary Production .

Biogeochemical Cycles – Hydrological cycle , Carbon dioxide cycle ,Nitrogen Cycle , Sulphur cycle

2.0 Environmental Chemistry (30%)

Environment Segments . Composition of atmosphere.

Atmospheric Structure . Radiation balance of the earth .

Chemical species and particulate present in the atmosphere .

Reaction in the atmosphere .

3.0 Environmental Toxicology (30%)

Fate and Transport of Chemicals in the Environment.

Principal of Toxicology. Mechanism of Toxicity.

Toxic Chemical in the Environment .

Effect of Toxic Chemical in the environment –Lead ,

Mercury, Manganese , Chromium , Arsenic, Cadmium , Zinc

Copper , Pesticides

REFERENCES

1. New Process of wastewater treatment and recovery G. Mattock(ED) Ellis Horwood
 2. Biochemical Engineering fundamentals 2nd ed. By J.E. Bailey and D.F. Ollis , McGraw-Hill (1986)
 3. Sawyer, C. N. and Mc. Carty . P.L. chemistry for sanitary Engineers
 4. Stanley E. Manohar Environmental Chemistry (Second edition) Willard Grant Press, Boston
Massachusetts.
 5. Gallsstone and Lewis , elements of Physical chemistry
 6. Albaigeo J. Analytical Techniques in Environmental chemistry Pergamon Press, New york
 7. Odum p. fundamentals of ecology WB saunters Co Philadelphia 1975 or latest edition.
- Kormondy EJ , Concepts of Ecology , Prentice Hall