CURRICULUM OF CIVIL ENGINEERING
RGUKT BASAR

III YEAR
II SEMESTER

Subject Code	Course Name	L-T-P	Credits
CE3201	Construction Engineering, Estimation and Specifications	4-2-0	4
CE3202	Hydrology and Irrigation Engineering	4-0-0	4
CE3203	Environmental Engineering	4-0-0	4
CE3204	Foundation Engineering	4-0-0	4
CS3001	Object Oriented Programming structures through Java	4-0-0	4
HS3201	Soft Skills	2-0-0	1
CE3801	Environmental Engineering Lab	0-0-3	2
CS3601	Object Oriented Programming structures through Java Lab	0-0-3	2
CE3902	Seminar-III		1
CE3000	Comprehensive Viva-I		1
Total		22-2-6	27

CE3201 Construction Engineering, Estimation and Specifications

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **4-0-0-4**

Objectives:

To study about standard dimensions of doors, windows, ventilators and other components of buildings

To study standard dimensions of different constructions in civil engineering

To describe different techniques of construction management projects

To illustrate economics of construction management projects

To understand the principles and specifications for estimations

To know the basic procedure for tenders and tender documents

To understand the detailed estimations of buildings, roads, and irrigation structures

To have a knowledge about different equipment and methods used in construction practices.

To study safety engineering practices of construction management projects

Unit –I

Conventional representations of building elements and materials. Drawing of doors, windows - framed, paneled and Glazes. Stair cases: RC staircases and steel stair cases. Drawing of plan, elevation and sections of simple residential single storey building. Drawing of plans, elevations and sections of two storied buildings like school, library etc. Drawing of RCC structural elements. Drawing of steel structural elements. Drawing of irrigation works, water supply works, foundation works and road cross sections.

Unit – II

Introduction, objectives of planning, construction stages, sequences of events in general civil engineering construction projects, construction schedule, Development of management techniques, Bar charts, Grant charts, CPM and PERT techniques, Network analysis examples. Introduction to cost analysis, cost reduction in construction management. Cost time analysis, Crashing the Network, Optimization, Resource Leveling and smoothing.

Unit - III

Basic principles and specifications: General and detailed specifications of works, departmental procedures for construction works, types of estimates, various types of contracts, turnkey projects, essentials of contracts and conditions of contracts, schedule of rates, standard data, rate analysis, bill of quantities.

Tenders and Documentations: Tenders, preparation of tenders, tender documentation, tender notice, work order, earnest deposit, and security money deposits, comparative statements, additional conditions mentioned by tenderer, and those implications , measurements book and muster roll, advances in tender procedures, national bidding/international bidding/shopping, BOT, BOOT, and PPP projects. Role of IT in tenders and construction industry.

Unit – IV

Estimations of buildings and roads: Traditional residential buildings, advances buildings (earth work, footing, columns, beams and slab etc..) by long wall and short wall method and center line method, bar bending schedules, estimations of reinforcement quantities, estimation of road works using levels (cross sections and longitudinal sections), preparation of estimates using computer software/excel sheet/available software's, introduction to MS project.
Estimation of septic tank, irrigation canal including earth work, simple bridge and overhead tank. Estimation of steel quantities for slab, beam, column, rectangular footing and overhead tank.

Unit - V

Construction Equipment: Factors affecting selection of equipment and methods - Technical and economic; Construction engineering fundamentals; Analysis of production outputs and costs; Methods and equipment for Earthmoving, Lifting and erection, Material transport, Pile driving, Dewatering; Concrete construction - batching, mixing, transport, placement, finishing, formwork, scaffolding; Steel construction - fabrication and erection.
Safety Engineering: Safety program, Direct and indirect loss due to accident, Classification of Construction of Construction accidents and causes, Location hazards and their elimination, Safety in demolition of buildings, Safety in storage and handling of materials and equipment.

Suggested Readings:

1. B.N. Dutta "Estimating & Costing in Civil Engineering Theory and Practice" UBS Publishers & Distributors Limited New Delhi 1996.
2. M. Chakrabarti "Estimating, Costing, Specification and Valuation on Civil Engineering" Calcutta, 2002
4. IS: 1200 - 1974- Parts 1 to 25, Methods of Measurement of Building and Civil Engineering Works, Bureau of Indian Standards, New Delhi
5. Standard Data Books of Central Public works Departments and Public Work Department of States.

CE3202 HYDROLOGY AND IRRIGATION ENGINEERING

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **4-0-0-4**

Objectives:

- To introduce the concepts of prediction, preservation, and vision about restoration of dwindling natural resources.
- To impart knowledge about the natural resources, their conservation, and efforts towards their sustainability.

UNIT –I

Hydrology: Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, raingauge networks, mean depth of over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves. Infiltration and infiltration indices, evaporation, evapo-transpiration, stream gauging, runoff and its estimation.

UNIT -II

Hydrograph analysis: hydrograph analysis, components, peaks flows, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph, IUH.

UNIT -III

Floods: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control.

UNIT -IV

Ground water: Types of aquifers, aquifer parameters, specific yield, storage coefficient, coefficients of permeability and transmissibility, Darcy's law, types of well, steady radial flow to wells in confined and unconfined aquifers, yield of open wells, safe yield, constant level pumping test, and recuperation test.

UNIT -V

Irrigation: Definition, necessity of irrigation, advantages and ill-effects of irrigation.
Soil-water-plant relationship: Vertical distribution of soil moisture, soil moisture tension, soil moisture stress, soil moisture constants, plant water relationship, moisture stress and plant response, consumptive use, crop factor, duty, factors affecting duty, types of crops and their water requirements, crop rotation.

Suggested Reading:

1. VenteChow,Hand book of applied Hydrology,McGraw-Hill Book Company,New York,1964
2. K.Subramanya,EngineeringHydrology,Tata McGraw-Hill Publishing Co.Ltd.1996.
3. H.M Raghunath,Hydrology-Principles,Analysis and Design,New Age International Publishers,1996.
4. Michael,A.M,'IrrigationTheory&Practice,Vikas Publishing House,New Delhi,1978.
5. Ray K.Linsley,Jr.,Max A. Kohler,JosephL.H.Paulhus,hydrology for Engineers,McGraw-Hill Book Company.

CE3203 ENVIRONMENTAL ENGNEERING

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **4-0-0-4**

Objectives:

- To fill the gap between general introductory environmental science and the more advanced environmental engineering.
- To explain the different sequential unit operations of water and wastewater treatment processes.
- To provide necessary engineering principles for analyzing the environmental issues
- To motivate the present and future generations to take suitable care of sustainability of all existing resources

Unit - I

Water Supply and Natural Phenomenon: Objectives of protected water supplies; Rate of demand; Population forecasts; Surface and Groundwater sources of water; Water analysis; Self Purification of Streams.

Unit - II

Water treatment and Distribution: Classification, description and design of: Coagulation, Flocculation, sedimentation, filtration, disinfection and softening process; Methods of Layout of Distribution pipes; Design of Distribution by Hardy Cross method for simple networks.

Unit - III

Wastewater and Primary Treatment: Wastewater Characteristics; Standards of Disposal; Treatment Objective and, Strategies; Layouts of Primary, Secondary and Advanced Treatment Units; Design of Preliminary and Primary Treatment Operations: Screens, Grit Chambers, Skimming Tank, Primary and Secondary Sedimentation Tanks.

Unit - IV

Biological Treatment: Classification and Design of: Activated Sludge Process; Oxygen and Nutrient Requirements; Principles of Trickling Filter Process, Oxidation Ponds, Lagoons.

Unit V

Sludge Treatment and Disposal: Sludge Thickening; Aerobic and Anaerobic Sludge Digestion Processes; Design of Digester Tank, Sludge Dewatering.

Suggested Reading:

1.Metcalf and Eddy, Wastewater Engineering - Collection, Treatment, Disposal and Reuse, McGraw Hill Pub. Co., 1995.
2.Nelson Leonard Nemerow, Industrial Waste Treatment, Butterworth-Heinemann, 2007.
3.Benefield L.D. and Randall C.D. Biological Process Designs for Wastewater Treatment, Prentice Hall Pub. Co., 1980.
4.P. N. Modi- Sewage Treatment Disposal and Waste Water Engineering.

CE3204 FOUNDATION ENGINEERING

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **4-0-0-4**

Objectives:

- To enable application of soil mechanics principles learned in previous semester to the practice of foundation engineering
- To enable computation of stress distribution in soils due to applied loads
- To understand suitability of shallow/deep foundations and their Geotechnical design
- To understand the necessity and usage of different foundation construction related aspects
- To learn about different methods of geotechnical investigations and its role in selection and design of foundation

Unit - I

Earth Pressures: States of earth pressure – Active, passive, at rest condition; Rankine's theory computation of active and passive earth pressure in cohesion lessand cohesive soils, smooth and rough walls,inclined backfill, depth of tension crack, Earth retaining structures – gravity, cantilever, counter fort, reinforced earth, etc.

Unit - II

Geotechnical Investigations*:* Necessity -Principles of exploration -objectives-Soil profile-collection of distributed & undistributed soil samples-samplers & quality of samples, In-situ tests -SPT, CPT, plate load test.

Stresses distribution in soils: Boussinesq's theory-Computation of increment in vertical stress due to application of a point load (its distribution on horizontal, vertical planes),uniformly distributed circular and rectangular areas -Pressure bulb -Significant depth-Construction and use of Newmark's chart -Westergaard's theory -Validity of elastic theories -Contact pressure distribution.

Unit - III

Introduction to foundations:Functional requirements- types- shallow and deep foundations-suitability

Shallow Foundations: Types of shear failures, Terazaghi's theory for safe bearing capacity of shallow foundations -Effect of type of shear failure/shape of the footing /water table, ultimate and allowable bearing capacity,Settlements of foundations- immediate, consolidation and creep settlements. Types of shallow foundations-Isolated, combined, mat/raft foundations etc.

Unit - IV

Pile Foundation: Piles, pile groups, Types of pile foundations based on load transfer mechanism, material type, mode of installation, functional use. Shaft and base resistances, down drag, negative skin friction, pile load tests, Estimation of vertical load carrying capacity of a single pile -static formulae/Dynamic formulae/Pile load tests-Cyclic pile load tests for separation of total capacity into bearing and friction components-Pile groups-necessity -efficiency of Pile groups-estimation of group capacity-Concept of Piled raft foundation.

Unit - V

Cassions: Necessity -Types-Essential components of open(well)/ box(floating)/ Pneumatic cassions-suitability-Sinking of caissons-correction for tilt &shift, dewatering.

Coffer dams: Necessity-types-suitability

Underpinning: Necessity-methods (pin/pile)-suitability

Geo-synthetics: classification-functions-applications.

Suggested Readings:

1. *Principals of Geotechnical Engineering, By: Braja M. Das., Fifth edition, First reprint 2002, low price edition, Thomson learning Inc.*
2. *Foundation Analysis and Design, By: Joseph E. Bowles., Fifth Edition, 2001 print, The McGraw Hill Companies Inc.*
3. *Basic & Applied Soil Mechanics, By: GopalRanjan / Rao A.S.R. 2003 print, New Age International Pvt Ltd.*
4. *Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard publishers Distributors, revised and enlarged sixth edition,2007.*

CS3001 OBJECTED ORIENTED PROGRAMMING THROUGH JAVA

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **4-0-0-4**

Objectives:

- To be able to differentiate between structures oriented programming and object oriented programming.
- To be able to use object oriented programming language like Java and associated libraries to develop object oriented programs.
- To Able to understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using Java language.
- To be able to apply concepts of operator overloading, constructors and destructors.
- To be able to apply exception handling and use built-in classes

UNIT-1:

Introduction to OOPS: Paradigms of Programming Languages, Basic concepts of Object Oriented Programming, Differences between Procedure Oriented Programming and Object Oriented Programming, Objects and Classes, Data abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication, Benefits of OOP , Application of OOPs.

Java : History, Java features, Java Environment, JDK, API.

Introduction to Java : Types of java program, Creating and Executing a Java program, Java Tokens, Keywords, Character set, Identifiers, Literals, Separator, Java Virtual Machine (JVM), Command Line Arguments, Comments in Java program.

UNIT -2:

Elements: Constants, Variables, Data types, Scope of variables, Type casting, Operators: Arithmetic, Logical, Bit wise operator, Increment and Decrement, Relational, Assignment, Conditional, Special operator, Expressions – Evaluation of Expressions

Decision making and Branching: Simple if statement, if, else statement, Nesting if, else, else if Ladder, switch statement, Decision making and Looping: While loop, do, While loop, for loop, break, labelled loop, continue Statement.-, Simple programs

Arrays: One Dimensional Array, Creating an array, Array processing, Multidimensional Array, Vectors, Wrapper classes, Simple programs

UNIT-3:

Strings: String Array, String Methods, String Buffer Class, Simple programs

Class and objects: Defining a class, Methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members, Nesting of Methods, this keyword, Command line input, Simple programs

Inheritance: Defining a subclass, Deriving a sub class, Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Overriding methods, Final variables and methods, Final classes, Finalizer methods, Abstract methods and classes, Visibility Control: Public access, Private access, friend, protected. Interfaces: Multiple Inheritance, Defining interface, Extending interface, Implementing Interface, Accessing interface variables, Simple programs

UNIT- 4:

Packages: Java API Packages, System Packages, Naming Conventions, Creating & Accessing a Package, Adding Class to a Package, Hiding Classes, Programs

Applets: Introduction, Applet Life cycle, Creating & Executing an Applet, Applet tags in HTML, Parameter tag, Aligning the display, Graphics Class: Drawing and filling lines, Rectangles, Polygon, Circles, Arcs, Line Graphs, Drawing Bar charts, Programs

AWT Components and Even Handlers: Abstract window tool kit, Event Handlers, Event Listeners, AWT Controls and Event Handling: Labels, TextComponent, ActionEvent, Buttons, CheckBoxes, ItemEvent, Choice, Scrollbars, Layout Managers- Input Events, Menus, Programs

UNIT-5:

Exception Handling: Limitations of Error handling, Advantages of Exception Handling, Types of Errors, Basics of Exception Handling, try blocks, throwing an exception, catching an exception, finally statement

Multithreading: Creating Threads, Life of a Thread, Defining & Running Thread, Thread Methods, Thread Priority, Synchronization, Implementing runnable interface, Thread Scheduling.

I/O Streams: File, Streams, Advantages, The stream classes, Byte streams, Character streams.

JDBC, ODBC Drivers, JDBC ODBC Bridges, Seven Steps to JDBC, Importing java SQL Packages, Loading & Registering the drivers, Establishing connection. Creating &Executing the statement.

Suggested References:

1. Programming with Java - E. Balagurusamy
2. Java the complete reference, 7th editon, Herbert schildt, TMH.
3. Understanding OOP with Java, updated edition, T. Budd, pearsoneduction.
4. Object oriented Programming in Java - Dr. G.Thampi
5. Let us Java – Yashavant Kanetkar - BPB Publications, New Delhi - First Edition 2012
6. An Introduction to Oops with Java - C Thomas WU - TataMc-Graw Hill, 4th Edition

HS3201 **Soft Skills II**

Externals: 60 **L-T-P-C***

Internals: 40 **2-0-0-1**

Objectives:

- To implement practically the skills needed for employment.
- To deal with the society in an acceptable way maintaining ethical standards.
- To make them competent to attempt and qualify in various tests.

UNIT-I

PPTs – Introduction - Oral presentation – Power point Presentation – Individual presentation – Group presentation

UNIT-III

Group Discussions - Speaking in Group Discussions - Discussing Problems and Solutions - Creating a Cordial and Cooperative Atmosphere - Using Persuasive Strategies - Being Polite and Firm - Turn-taking Strategies - Effective Intervention - Reaching a Decision - **Organizational GD** - Brainstorming - Nominal Group Technique - Delphi Technique - **GD as Part of Selection Process** - Characteristics - Evaluation and Analysis - Approach to Topics and Case Studies

UNIT-IV

Interviews – Types of interviews – Body language – Fluency – Etiquettes – Mock interviews

UNIT-V

Formal Letters and Email - Introduction - Formats of Written Correspondence - Types of Messages - **Letter Writing** - The Seven Cs of Letter Writing - Purpose - Structure - Layout - Principles - Planning a Letter - **Cover Letters** - Writing the Cover Letter - Academic and Business Cover Letters - Cover Letters Accompanying Résumés - **Emails** - Advantages and Limitations - Style, Structure, and Content - Email Etiquette - Effectiveness and Security

Suggested References:

1. Business Communication – Meenakshi Raman
2. Presenting to Win - Jerry Weissman
3. Boring to Bravo - Kristin Arnold
4. Advanced Presentations by Design- Andrew Abela

CE3801 ENVIRONMENTAL ENGINEERING LAB

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **0-0-3-2**

List of experiments:

1. To determine Electrical Conductivity of water sample.
2. To determine the pH value of water sample by pH Meter.
3. To determine the Alkalinity of water sample.
4. To determine the Hardness value of water sample.
5. To determine the Turbidity water sample by Nephlometric method.
6. To determine the Sodium content of water sample.
7. To determine the Chloride content of water sample.
8. To determine the Bromide content of water sample.
9. To determine the Fluoride content of water sample.
10. To determine the Nitrogen, Nitrate content of water sample.
11. Determination of COD.
12. To determine the DO value of given water sample by DO meter.
13. Determination of BOD
14. To determine the Faecal Coliforms.
15. Determination of Total Suspended Solids (TSS) and Total dissolved Solids (TDS) in given water sample.

CS3601 OBJECTED ORIENTED PROGRAMMING LAB

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **0-0-3-2**

Objectives:

- To be able to apply an object oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
- To be able to reuse the code and write the classes which work like built-in types.
- To be able to design applications which are easier to debug, maintain and extend.
- To be able to apply object-oriented concepts in real world applications.

Experiments:

1. A program to illustrate the concept of class with constructors, methods and overloading.
2. A program to illustrate the concept of inheritance and dynamic polymorphism.
3. A program to illustrate the usage of abstract class.
4. A program to illustrate multithreading.
5. A program to illustrate thread synchronization.
6. A program to illustrate Exception handling.
7. A program to illustrate user-defined Exceptions
8. A program to demonstrate use of User-defined Packages.
9. A program using String Tokenize.
10. A program using Linked list class
11. A program using Tree Set class
12. A program using Hash Set and Iterator classes
13. A program using Map classes.
14. A program using Enumeration and Comparator interfaces.
15. A program using File and Filename Filter
16. A program to illustrate the usage of Byte and Character I/O streams.
17. A program to illustrate the usage of Serialization.
18. Program using Data class.\
19. An application involving GUI with different controls, menus and event handling.
20. A program to implement an applet.

For the detailed list of programs refer the lab manual.

Note: Any experiment according to the syllabus of CS3001 can be substituted

CODE: CE3902 **SEMINAR-III**

Scheme of Internal Exam **: 25 Marks**
Credits **: 1**

Objectives:
Objective of the project seminar is to actively involve the students in preparation of the final year project with regard to following components:

- Problem definition and specification
- Literature survey, familiarity with research journals
- Broad knowledge of available techniques to solve a particular problem.
- Planning of the work, preparation of graphs, bar (activity) charts and analyzing the results.
- Presentation - oral and written.

The evaluation is purely internal and will be conducted as follows:

Preliminary Report on progress of the work and viva	05 marks
Final report	05 marks
Presentation and Defence before a departmental committee consisting of Head, a senior faculty and supervisor	15 marks

CODE: CE3000 **COMPREHENSIVE VIVA-I**

Scheme of External Exam **: 50 Marks**
Credits **: 1**

Students are assessed in the courses they have undergone till the completion of that academic year. They are asked to comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills.

There are no sessional marks. The end examination shall be conducted by a committee consisting of an External examiner, Head of the department and two senior faculty members. The evaluation is purely external and it carries marks 50.