CURRICULUM OF CIVIL ENGINEERING
RGUKT BASAR

II YEAR

II SEMESTER

Subject Code	Course Name	L-T-P	Credits
CE2201	Hydraulic Engineering	4-1-0	4
CE2202	Geo Science	4-0-0	4
CE2203	Structural Analysis-I	4-1-0	4
CE2204	Design of Concrete Structures	4-0-0	4
BSBE2001/3001	Environmental Science	4-0-0	3
BM2101	Personality Development-I	2-0-0	1
CE2801	Hydraulic Engineering Lab	0-0-3	2
CE2802	Geo Science Lab	0-0-3	2
CE2803	Concrete Lab	0-0-3	2
CE2902	Seminar-II		1
	Total	22-2-9	27

CE2201 HYDRAULIC ENGINEERING

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **4-1-0-4**

Objectives:

- To study the concept of the flow trough channels and economical design of channels.
- To know the basic concept of gradually varied flow , hydraulic jump and their applications
- To understand the boundary layer theory , concept of drag , lift of streamlined bodies
- To know different theories on dimensional analysis and model concept
- To understand the basic principles of hydraulic turbines , pumps and their hydraulic design

UNIT –I

Steady uniform flow through open channels: Descriptions and definitions , difference between pipe flow and channel flow , velocity and pressure distributions in a channel cross section, energy and momentum correction coefficients , friction to flow in open channels, uniform flow, chezy's formula, most efficient channel section, specific energy concept and applications of critical depth

UNI T-II

Gradually varied flow: Significance of Froude's number, dynamic equation for gradually varied flow, classification of gradually varied flow profiles, computation for flow profiles,direct step method. Hydraulic Jump: Momentum equation for jump in a horizontal rectangular channel, elementary surge analysis.

UNI T-III

Dimensional analysis and model studies: Dimensional analysis as a tool in experimental hydraulics, Buckingham's theorem, applications, geometric, kinematic and dynamic Similarity laws, significance of Reynolds, Froude and Mach similarity laws, different types of models and their scale rations.

UNI T-IV

Hydraulic turbines:classification, specific speed, velocity triangles and principles of designof reaction and impulse turbines, characteristic curves.

UNIT- V

Centrifugal pumps and Reciprocating pumps:various components, work done and efficiency, minimum starting speed,Euler head equation, specific speed and characteristics curves of centrifugal pumps.

Suggested Reading:

1.C.S.P.Ojha, R.Berndtsson.P.N.Chandramouli,Fluid Mechanics and Machinery,OxfordUniversity Press, New Delhi, 2010.

2. HanifChaudhary,M, Open Channel flow, Prentice-Hall of indiapvt.Ltd., New Delhi,1993.

3. Subramanya, K,Flow through open channels, Tata McGraw-Hill Publishing Company, New Delhi, 1986.

4. A.K.Jain Fluid Mechanics,Khanna publishers, 1993.

CE2202 **GEOSCIENCE**

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **4-0-0-4**

Objectives:-

- To understand all spheres of the Earth
- To understand the formation of different types of rocks and rock-cycle.
- To assess the geological features like faults,folds,joints etc.
- To study the concept of weathering, process of formation of soil
- To understand different Geological hazards.
- To conceptualize the site investigation methods to know the ground conditions for dam sites,tunnels and other structures.

UNIT-I

A Brief Outline of Geo Science.

Earth System: Lithosphere, Hydrosphere, Cryo-sphere and atmosphere and their interactions;
Solid Earth: Shape, size, interior of the solid earth.
Earth Processes: Plate Tectonics, Volcanism.

UNIT-II

Geological materials: rocks, soils, minerals (clay mineralogy), Engineering and Genetic Classification of soils, rocks, rock cycles, rock-water interaction. Earth Processes and their consequences, Geomorphological features, structures (folds, faults);

UNIT-III

Geology of solids: Formation, geological classification, description and engineering use of soils, types of Indian soils.

Hydro Geology: Hydrologic cycle, water table, aquifers, occurrence of ground water in various lithological formations, ground water movement, springs, ground water exploration and ground water provinces of India.

UNIT-IV

Geology of Dams and Reservoirs: Types of Dams, Problems associates with Dam foundations and reservoirs, engineering geological investigations for a masonry dam site, Analysis of dam failure; Engineering Geology of major Dam sites of India.

UNIT-V

Tunnels: Stand up time of different rocks, Engineering Geological investigations of tunnels in rock, problems in tunneling, pay line and over break,logging of tunnels and geology of some well-known Indian tunnels.

Geological Hazards: Geological aspects of Earthquakes, tsunamis and Landslides, Disaster prevention, mitigation and management

Suggested Readings:

1. F.G Bell,Engineering Geology,Elsivier-2007.

2. Dimitrip.krynine and William R.judd,principles of Engineering Geology &Geotechnics CBS publishers&Distributors,First Edition,1998.

3. BP.Attewel and I.W.Fanner,principles of Engineering Geology, chapman and Hall 1976.

4. officers of Geological survey of india,"Engineering Geology case Histories"Miscellaneouspub.No 29,1975

CE2203 **STRUCTURAL ANALYSIS-I**

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **4-0-0-4**

Objectives:

- To understand basic methods for the analysis of statically indeterminate beams and frames.
- To evaluate the displacements and redundant forces using energy methods.
- To obtain analysis of arches with varying degrees of indeterminacy.

Unit - I

Slope deflection method: Application of the method to continuous beams with and without sinking of supports, single bay-bay portal frames (Degree of freedom not exceeding three), loading on each span may be point load(s) and /or uniformly distributed load on whole span, shear force and bending moment diagrams.

Unit - II

Moment distribution method: Application of the method to continuous beams with and without sinking of supports, single bay-bay portal frames (Degree of freedom not exceeding three), loading on each span may be point load(s) and /or uniformly distributed load on whole span, shear force and bending moment diagrams.

Unit – III

Kani's method: Application of the method to continuous beams with and without sinking of supports, single bay-bay portal frames (Degree of freedom not exceeding three), loading on each span may be point load(s) and /or uniformly distributed load on whole span, shear force and bending moment diagrams.

Unit - IV

Strain energy method: Deflections of statically determinate trusses and frames using unit load method.

Redundant trusses and frames: Analysis of plane trusses with one degree of redundancy(internal/external) and plane frames with one degree of redundancy, Lack of fit and temperature effect.

Unit – V

Elastic theory of arches: Eddy's theorem, three hinged parabolic and segmental arches, determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading, influence lines for horizontal thrust, bending moment, normal thrust and radial shear.

Two hinged arches: parabolic and segmental, determination of horizontal thrust, bending moment, normal thrust, and radial shear for static loading.

Suggested Readings:

1. *Structural Analysys by RcHibbeler, 6th Edition, Pearson Publications*
2. *Basic Structural Analysis - C.S. Reddy, Tata McGraw Hill.*
3. *Intermediate Structural Analysis - C. K. Wang, McGraw-Hill*
4. *Theory of Structures - Volumes 1 and 2, S P Gupta and G S Pandit, Tata McGraw Hill.*
5. *Structural Analysis - L.S.Negi& R.S. Jangid, Tata McGraw Hill.*
6. *Classical Structural Analysis - Anthony E. Armenikas, McGraw Hill.*
7. *S.B. Junakar and Shah, Mechanics of structures, Charotar Pub. House, 2001.*
8. *D.S. PrakashRao, Structural analysis – A Unified Approach, University Press, 1996.*
9. *B.C. Punmia and A.K. Jain, Theory of structures, Laxmi Publications, New Delhi, 2004.*

CE2204 DESIGN OF CONCRETE STRUCTURES

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **4-0-0-4**

Objectives:

- To know the IS codal provisions as applicable for the designs.
- To understand the design philosophies and basics of RCC structural designs.
- To understand the design principles in flexure, shear and torsion.
- To learn the design of various components of RCC structures.

Unit - I

Design Philosophies: Development of design philosophies-Working stress method, Ultimate load method, and Limit state method – Concepts, Characteristics loads and strengths, Partial safety factors, stress-strain relationship for concrete and steel, stress block parameters.

Working Stress Method: Design of RCC beams – Balanced, under – reinforced and over Reinforced sections – Rectangular, T and L sections, Design of singly and doubly reinforced Rectangular, T and L sections.

Unit - II

Limit state of collapse in flexure: Assumptions, Design for flexure – Singly and doubly Reinforced rectangular, T and L sections.

Limit state of collapse in shear and torsion: Design for shear and torsion. Limit states of Serviceability: Check for deflection and cracking.

Unit - III

Design of slabs (Limit state method): Design of one way and two way slabs – Simply supported and continuous slabs subjected to uniformly distributed loads, Detailing of reinforcement, Check for serviceability of slabs.

Design of stair cases (Limit state method): Types of stairs, Effective span, Distribution of Loading on stairs, Design and detailing of dog – legged stair cases.

Unit - IV

Design of columns (Limit state method): Assumptions, Design of axially loaded circular Square and rectangular columns, Design of columns with Uni–axial and Bi–axial bending Interactions diagrams.

Unit - V

Design of footings (Limit state method): Design of isolated footings of uniform depth and Sloped footing, Design of square, rectangular and circular footing as per IS code, Design of Combined rectangular slab footing, Combined rectangular beam and slab footing for two columns.

Suggested Reading:

1. *IS 456:2000/SP-16 Charts/IS-875:1987 part I-V*
2. *Punmia B.C., Jain A.K. And Jain A.K., RCC Designs, Laxmi Publications, 2006.*
3. *Krishna Raju N. And Pranesh R.N., Reinforced Concrete Design, New Age International Pvt, Ltd., 003.*
4. *Varghese P.C; Limit State Design of Reinforced Concreate, Prentice of India Pvt, Ltd., 2002.*
5. *Varghese P.C; Design of Reinforced Concrete, Foundations, PHI Learning Pvt. Ltd.,2009.*
6. *D.S. PrakashRao, Design Principles and Detailing of Concrete Structures, Tata McGraw Hill Publishing Co. Ltd., 1995.*

BSBE2001/3001 ENVIRONMENTAL SCIENCE

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **4-0-0-4**

Objectives:

- To study the sources of water,floods and its impact on environment
- To know about the ecosystem and energy resource system
- To understand the Biodiversity concept and its advantages
- To study different types of pollution and its impact on environment
- To know the social and environment related issues and their preventive measures

Unit - I

Environmental studies: Definition, scope and importance, need for public awareness.

Natural resources: Water resources; use and over utilization of surface and ground water, Floods, drought, conflicts over water, dams-benefits and problems. Effects of modern Agriculture, fertilizer-pesticide problems, water logging and salinity.

Unit - II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem(ponds, streams, lakes, rivers, oceans, estuaries).

Energy resources: Growing energy needs renewable and non-renewable energy sources.

Land resources.land as resource, land degradation, soil erosion and desertification.

Unit - III

Biodiversity: Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

Unit - IV

Environmental pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid and liquid waste management.

Environment protection act: Air, water, forest and wild life Acts, enforcement of Environmental legislation.

Unit - V

Social Issues and the Environment: Water conservation, watershed management, and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology, disaster management cycle, and disaster management in India.

Suggested readings:

1. A.K De, Environmental Chemistry,Wiley Eastern Ltd.
2. E.P. Odum, Fundamentals of Ecology,W.B. Sunders Co., USA.
3. M.N, Rao and A.K. Datta, Waste Water Treatment Oxford and IBK Publications.
4.Benny Joseph, Environmental Studies, Tata McGraw Hill, 2005.
5. V.K. Sharma, Disaster Management, National Centre for Disaster Management, IIPE, Delhi, 1999.

Reference:

1. Green Buildings Council of India, Teri Document.
2. GL. Karia and R.A. Christian, Waste Water Treatment, Concepts and Design Approach, Prentice Hall of Indian, 2005

BM2201 **PERSONALITY DEVELOPMENT**

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **2-0-0-1**

Guidelines: Learning approach is based on Real time case studies with class room activities

Course Objectives:

1. To develop interpersonal skills and be an effective goal oriented team player.
2. To develop professionals with idealistic, practical and moral values.
3. To develop communication and problem solving skills.
4. To re-engineer attitude and understand its influence on behavior.
5. To enhance holistic development of students and improve their employability skills.

UNIT I-SELF ANALYSIS (6 hours)

SWOT Analysis, Who am I, Personality Traits, Importance of Self Confidence, Self Esteem.

UNIT II-GOALS SETTINGS (6 hours)

Short term, Long term goal settings, SMART concept
Diversifying Risk and Optimizing Opportunities

UNIT III- TEAM DYNAMICS WITH INTERPERSONAL SKILLS (8 hours)

Team Dynamics, Team Work, Interpersonal Skills

Behavioral Skills GD, PI, Body Language Public Speaking, Verbal, Non Verbal Communications

UNIT IV-CREATIVITY AND RATIONALITY (8 hours)

Out of Box thinking, Idea Generation with creativity Brain Storming, Effective group meetings, Rationalization of ideas and way to effective implementation.

Class room and team activities coupled with group tasks depending upon time availability

CE2801 HYDRAULICS ENGINEERING LAB

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **0-0-3-2**

List of experiments:

1. Measurement of coefficient of discharge through notches (V notch and Rectangular notch).
2. To investigate the reaction forces produced by the change in momentum of a fluid flow.
3. To demonstrate ground water flow and the resulting hydraulic gradient between two different potentials.
4. To determine the Cone of Depression for a single/double well in an unconfined aquifer.
5. To obtain the characteristic curves for an Impulse turbine operating at a range of fluid flow rates.
6. To obtain the characteristic curves for Reaction turbine operating at a range of fluid flow rates.
7. To obtain the characteristic curves for Francis turbine operating at a range of fluid flow rates.
8. To determine Rainfall-runoff relationships (storm hydrographs), Generation of Overland Flow, sediment yield using Advanced Environmental Hydrology System

CE2803 **GEO SCIENCE LAB**

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

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

List of experiments:

1) Identification and description of physical properties of Minerals.

2) Identification and description of geological and geotechnical characterisitcs of rocks ; IS Code: 1123 (1975)

3) a) Study of structural models (folds, faults and unconformities) and

b) Measurement of strike and dip of planar features by clinometers compass.

4) Vertical electrical sounding (VES)- a field experiment to determine depth to water table and bed rock .

5) Seismic refraction survey to determine depth to bed rock (demonstration only)

6) Stereoscopic examination of aerial photographs pertaining to landforms, vegetation and water bodies.

9) Study of geological maps of India with reference to occurrence of building stones .

10) Study of a) Geotechnical Map of India

b) Hydro Geological Map of India

11) Study of Foundation Geological Maps and sections pertaining to the major dam sites of India.

CE2803 CONCRETE LABORATORY

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **0-0-3-2**

List of experiments:

A) Tests on cement and mortar

1. Fineness of cement by sieving
2. Fineness of cement by air permeability test
3. Consistency of cement
4. Initial setting time and final setting time
5. Preparation and testing of mortar cubes
6. Soundness of cement by using lechartlier's equipment
7. Specific gravity of cement
8. Flow test on mortar

B) Test on aggregates

9. Fineness modules of coarse and fine aggregate
10. Bulking of sand
11. Determination of Impurities in sand

C) Tests on concrete for workability

12. Slump test
13. Compaction factor test
14. Vee- bee consistency test
15. V funnel test for self-compacting cement (demonstration)

D) Tests on concrete (strength)

16. Compressive strength
17. Flexural strength (indirect tensile strength test)
18. Rebound hammer test

Suggested Readings:

1. IS codes of practice.
2. Shetty,M.S(2004),"Concrete Technology, Theory & Practice", S.Chand and Co. Pvt.Ltd.

CODE: CE2902 **SEMINAR-II**

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