5th SEMESTER

Sl. No.	Category	Code	Course Title	Hours per week			Credits
Theory Papers				L	T	P	
1	PCC	CEC511	Design of RC structures	3	0	0	3
2	PCC	CEC512	Structural Analysis-II	3	0	0	3
3	PCC	CEC513	Engineering Hydrology	2	0	0	
4	PCC	CEC514	Foundation Engineering	3	0	0	3
5	PCC	CEC515	Environmental Engineering-I	3	0	0	3
6	PCC	CEC516	Transportation Engineering	3	0	0	3
8	GSC	BTHESP501	Essential Studies for Professionals – V	0	0	1	0.5
9	MC	MC001	Environmental Science	0	0	0	0
Practical / Sessional Papers							
10	PCC	CEC595	Environmental Engineering-I Lab	0	0	2	1
11	PCC	CEC596	Transportation Engineering Lab	0	0	2	1
12	GSC	BTHSDP581	Skill Development for Professionals - V	0	0	2	1
13	PROJ	BTHPRJCE581	Mini Project	0	0	0	0.5
Additional							
INT	INT	INT501	Internship/Industry	0	0	0	3
14	MOOCS	MAR581	Mandatory Additional Requirements (MAR)	-	-	-	-
15	IFC	MOOCs	Massive Open Online Course	-	-	-	-
16	MAR	IFC	IFC	-	-	-	-
TOTAL							**25**

Design of RC Structures

CEC511

L-T-P: 3-1-0

Credits: 4

Pre-requisite: Concrete Technology and Solid Mechanics

Introduction: In this course students will understand the development and concept of different design philosophies and extend their study to the behavior and design of various reinforced concrete members subjected to gravity loads. The study will include deflections due to bending of beams, axial load-moment interaction for uniaxial and biaxial bending of columns, design and detailing of continuous one-way beams and slabs, design and detailing of two-way slabs, and design for shear and bond, design of isolated footings and staircase.

Course Outcomes (CO):

CO1: Understand the concept of working stress method and limit state collapse ie. flexure, shear, torsion, bond

CO2: Design and detailing reinforced concrete beam: Singly, doubly, T and L.
CO3: Design and detailing of one-way and two-way slab panels and continuous slab
CO4: Design and detailing of column, footing and staircase.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3								3	2
CO2	3	3	3	2	3									2
CO3	3	2	3	3	3								3	
CO4	3	3	3	3	1								3	

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Introduction: Principles of design of reinforced concrete members-Working stress and Limit State method of design.

Module 2: Working stress method of design: Basic concepts and IS code provisions (IS: 456 2000) for design against bending moment and shear forces * Balanced, under reinforced and over reinforced beam/ slab sections; design of singly and doubly reinforced sections.

Module 3: Limit state method of design: Basic concepts and IS code provisions (IS: 456 2000) for design against bending moment and shear forces; concepts of bond stress and development length; Use of 'design aids for reinforced concrete' (SP:16).

Module 4: Analysis, design and detailing of singly reinforced rectangular, 'T', 'L' and doubly reinforced beam sections by limit state method.

Module 5: Design and detailing of one-way and two-way slab panels as per IS code provisions.

Module 6: Design and detailing of continuous beams and slabs as per IS code provisions.

Module 7: Staircases: Types; Design and detailing of reinforced concrete doglegged staircase.

Module 8: Design and detailing of reinforced concrete short columns of rectangular and circular cross sections under axial load. Design of short columns subjected to axial load with moments (uniaxial and biaxial bending) – using SP 16, Design of long columns.

Module 9: Shallow foundations: Types; Design and detailing of reinforced concrete isolated square and rectangular footing for columns as per IS code provisions by limit state method.

Text Books

1. Pillai and Menon, "Reinforced Concrete Design", Tata Mcgraw Hill.

2. B.C. Punmia , Ashok Kumar Jain, Arun Kumar Jain , "R.C.C. Designs**",** PanWorld Books

NPTEL/MOOCs Links

https://www.coursera.org/learn/design-basics-of-rcc-buildings

Structural Analysis-II

CEC512
L-T-P: 3-0-0
Credits: 3

Pre-requisite: Solid Mechanics
Introduction: The course includes analysis of indeterminate structures.
Course Outcomes (CO):
Upon successful completion of this course, students should be able to:
CO1: Formulate Equilibrium and compatibility equations for structural members.
CO2: Analysis of statically Indeterminate beams.
CO3: Analysis of Two hinge arches.
CO4: Analyze of statistically indeterminate structures.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3			3	3		3				3	
CO2	2	3	3			3	3		2				3	2
CO3	3	3	2			3	3		3		3		3	2
CO4	3												3	

3 – High; 2 – Medium; 1 – Low

Module 1: Analysis of statically Indeterminate structures by force method: Theorem of three moments, Energy methods, Force method (method of consistent deformations) [for analysis of propped cantilever, fixed beams and continuous beams (maximum two degree of indeterminacy) for simple loading cases], Analysis of two hinged arch.
Module 2: Analysis of statically Indeterminate structures by displacement method: Moment distribution method - solution of continuous beam, effect of settlement and rotation of support, frames with or without side sway. Slope Deflection Method – Method and application in continuous beams and Frames. Approximate method of analysis of structures: Portal & Cantilever methods.

Textbook:

1. Statically Indeterminate Structures CK Wang ByMcGraw Hill Publications.

2. Engineering Mechanics Of Solids E.P.Popov By Pearson Educations.

NPTEL/MOOCs Links
https://nptel.ac.in/courses/105101086

Pre-requisite: Fundamentals of Mathematics and Physics at XI and XII level are required.
Introduction: The purpose of the course is familiar to hydrological cycle, precipitation, Abstractions from precipitation, runoff, Ground water and well hydrology.
Course Outcomes (CO):
Upon successful completion of this course, students should be able to:
CO1: Understand the interaction among various processes in the hydrologic cycle
CO2: Study types and classes of hydrologic simulation models and design procedures for safe and effective passage of flood flows for design of hydraulic structures
CO4: Understand the basic aquifer parameters and estimate groundwater resources for different hydro-geological boundary conditions.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3					3		3				3	
CO2	2	3				3	3		2				3	
CO4	3	2				3	3		3					

Course Contents:
Module 1: **Introduction -** hydrologic cycle, water-budget equation, history of hydrology, world water balance, applications in engineering, sources of data.
Module 2: **Precipitation -** forms of precipitation, characteristics of precipitation in India, measurement of precipitation, rain gauge network, mean precipitation over an area, depth-area duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.
Module 3: Abstractions from precipitation - evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Module 4: Runoff - runoff volume, SCS-CN method of estimating runoff volume, flow-duration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows.

Module 5: Ground water and well hydrology - forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests.

Text/Reference Books

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill
2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill

NPTEL/MOOCs Links

https://nptel.ac.in/courses/105101214
https://www.linkedin.com/learning-login/share?account=229219690&forceAccount=false&redirect=https%3A%2F%2Fwww.linkedin.com%2Flearning%2Fpractical-engineering%3Ftrk%3Dshare_ent_url%26shareId%3DaRMxYXL1R%252FWx%252BxwmwYCtVQ%253D%253D

Foundation Engineering

CEC514

L-T-P: 3-1-0

Credits: 4

Pre-requisite: Geotechnical Engineering

Introduction: The course on Foundation Engineering provides the students necessary geotechnical engineering skills to analyze and design shallow and deep foundation systems under different loading and soil conditions.

Course Outcomes (CO):

CO1: Determine the earth pressures on foundations and retaining structures.
CO2: Analyze shallow and deep foundations
CO3: Calculate the bearing capacity of soils and foundation settlements
CO4: Understand soil exploration methods

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	

CO2	3	3	1	3									3	
CO3	3		2	3									3	
CO4	3		3	3									3	

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module1: Earth pressure theories: Plastic equilibrium of soil, Earth pressure at rest, Active & passive earth pressure, Rankine's & Coulomb's earth pressure theories, wedge method of analysis, estimation of earth pressure by graphical construction (Culmann Method).

Module 2: Retaining wall & sheet pile structures: Proportions of retaining walls, stability checks, cantilever and anchored sheet piles, free earth and fixed earth method of analysis of anchored bulkheads.

Module 3: Stability of slopes: Analysis of finite and infinite slopes, Swedish and friction circle method, Taylor's stability number, Bishop's method of stability analysis

Module 4: Site investigation & soil exploration: Planning of sub-surface exploration, methods, sampling, samples, Insitu tests: SPT, SCPT, DCPT, Field vane shear, Plate load test.

Module 5: Shallow foundations: Safe bearing capacity, Terzaghi's bearing capacity theory, effect of depth of embedment, water table, eccentricity of load, foundation shape on bearing capacity, Bearing capacity as per 1S 6403.

Module 6: Settlement analysis of shallow foundation: Immediate and consolidation settlement, correction for rigidity and dimensional effects, settlement in various types of soil, IS-1904 and 8009recommendations, Allowable bearing capacity

Module 7: Deep foundations: Pile: Types, load transfer mechanism, Determination of load carrying capacities of piles by static and dynamic formulae, Recommendations of IS 2911, Pile group: Group efficiency, Negative skin friction, pile load test.

Text Books

1. Soil Mechanics and Foundation Engineering by Dr. K.R Arora
2. Geotechnical Engineering by V.N.S Murthy

References

1. Foundation Analysis & Design J.E. Bowels McGraw Hill
2. Relevant latest IS Codes (IS 6403, IS 1904, IS 8009, IS 2911) Bureau of Indian Standard

NPTEL/MOOCs Links

https://www.coursera.org/learn/introduction-of-pile-foundation

https://www.coursera.org/learn/slope-engineering
https://www.coursera.org/learn/grouping-testing--quality-control-of-pile-foundations
https://archive.nptel.ac.in/courses/105/105/105105176/

Environmental Engineering-I

CEC515

L-T-P: 3-0-0

Credits: 3

Pre-requisite: Fundamentals of Mathematics at XI and XII level is required, Basics of environmental science.

Introduction: The course covers basic concepts of ecology, water quality requirements, design of water treatment plant, distribution.

Course Outcomes (CO):

Upon successful completion of this course, students should be able to:

CO1: To forecast the population and estimate water demand.

CO2: To analyze characteristics of water and understand different sources of water.

CO3: To understand and design various water treatment units.

CO4: To understand and design the water distribution network.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						3	3						3	2
CO2						3	3						3	2
CO3	3						2		3				3	
CO4	2						3						3	

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: **Demand:** Various types of water demands, total requirement of water for a city, per capita demand, factors affecting per capita demand, variation in demand, design capacities for various water supply components, design flows, design periods, and design population, population forecasting methods.

Module 2: Sources of water: Hydrological cycle, surface sources of water, storage reservoir and surface sources of supply, quality and quantity of surface water and their usefulness for public water supplies, sub surface or underground water sources, geological factors governing the

occurrence of ground water, zones of underground water, ground water yield, recuperation test, aquifer and their types, infiltration galleries, infiltration wells and springs, tube wells, yield of wells and tube wells by Thiem's and Dupuit's equilibrium formula, well loss and specific capacity of wells, Intakes and pumps: Factors governing the location of an intake, intake tower, canal intake, types of pumps for lifting water, factors affecting the selection of a particular type of pump, pumping stations.

Module 3: Quality of Water: Physical, chemical and biological water quality parameters (WQP), sources, measurement techniques and effect of WQPs, permissible limits of WQPs as per Indian standards, water borne diseases and their control.

Module 4: Treatment of Water: Historical overview of water treatment, water treatment process (theory and application): screening, plain sedimentation, sedimentation aided with coagulation, filtrations, disinfection, water softening, Aeration, miscellaneous treatment units.

Module 5: Distribution of Water: Methods of distribution of water, layout of distribution networks, distribution reservoirs, distribution systems, distribution system components, capacity and pressure requirements, design of distribution system, hydraulic analysis of distribution systems, pumping required for water supply systems.

.

Text/Reference Books

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey
2. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008
3. Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw -Hill International Editions, New York 1985
4. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi
5. Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999

Environmental Engineering- I Lab

CEC595

Lists of Experiments:

Choice of experiments from the following:

1. Determination of turbidity for a given sample of water.
2. Determination of color for a given sample of water
3. Determination of solids in a given sample of water: Total Solids, Suspended Solids and Dissolved Solids.
4. Determination of pH for a given sample of water.
5. Determination of concentration of Chlorides in a given sample of water.
6. Determination of carbonate, bi-carbonate and hydroxide alkalinity for a given sample of water.
7. Determination of hardness for a given sample of water.
8. Determination of concentration of Fluorides in a given sample of water.
9. Determination of concentration of Iron in a given sample of water.
10. Determination of the Optimum Alum Dose for a given sample of water through Jar Test.

11. Determination of the Residual Chlorine in a given sample of water.
12. Determination of the Chlorine Demand for a given sample of water.
13. Determination of the Available Chlorine Percentage in a given sample of bleaching powder
14. Determination of amount of Dissolved Oxygen (DO) in a given sample of water.
15. Determination of the Biochemical Oxygen Demand (BOD) for a given sample
16. Determination of the Chemical Oxygen Demand (COD)
17. Determination of bacteriological quality of water: presumptive test, confirmative test.

NPTEL/MOOCs Links

https://archive.nptel.ac.in/courses/127/105/127105018/

Transportation Engineering

CEC516

L-T-P: 3-0-0

Credits: 3

Pre-requisite: Fundamentals of Mathematics and Physics at XI and XII level are required, Solid Mechanics.

Introduction: The course covers Highway development and planning, Geometric design of highways, Traffic engineering & control, Pavement materials and*:* Design of pavements.

Course Outcomes (CO):

Upon successful completion of this course, students should be able to:

CO1: Carry out surveys involved in planning and highway alignment

CO2: Design the geometric elements of highways and expressways

CO3: Carry out traffic studies and implement traffic regulation and control measures and intersection

CO4: Characterize pavement materials and

CO5: Design flexible and rigid pavements as per IRC

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				3	3		3				3	
CO2	3		3				2		3				3	
CO3	3		3				3		3					
CO4	2								1					2
CO5	3	3	3				3		3				3	

3 – High; 2 – Medium; 1 – Low

Course Content:

Module 1: **Highway development and planning**-Classification of roads, road development in India, Current Road projects in India; highway alignment and project preparation.

Module 2: **Geometric design of highways-:** Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems.

Module 3: **Traffic engineering & control-** Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems.

Module 4: **Pavement materials-** Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems.

Module 5: Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC; problems.

Text/Reference Books

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
2. Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers
3. Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning
4. Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
5. Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
6. Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition,2009

NPTEL/MOOCs Links

https://nptel.ac.in/courses/105105107

https://www.coursera.org/learn/highway-geometry-and-pavement-design

Transportation Engineering Lab

CEC596

Possible Experiments:

Choice of experiments from the following:

Practical Work:

1. Tests on highway materials – Aggregates- Impact value, Los-Angeles Abrasion value water absorption, Elongation & Flakiness Index.
2. Bitumen & bituminous materials: Specific gravity, penetration value, softening point, loss on heating.
3. Flash & Fire point test.
4. Stripping value test.
5. Design of B.C. & S.D.B.C. Mix
6. CBR Test.
7. Marshal Stability Test

Environmental Science
MC001
L-T-P: 0-0-0
Credits: 0

Pre-requisite: Basic concepts in social Science.

Introduction: This course examines basic environment. The Topics to be covered (tentatively) include: Renewable and non-renewable resources, Ecosystems in INDIA, Environmental Pollution, Social Issues and the Environment.

Course Outcomes (CO):

In this course we will study the basic components of numerical system. Students are expected to be capable of understanding the Indian society for environment, their advantages and drawbacks, how to implement them in ecology aspect, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Students would be able to know Environment problem properly.

CO2: Students would be able to know ecology system in India, national plan to protect ecology.

CO3: By analyzing student will be proper person to guide our society

CO4: To become an efficient human being for the society.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	3		3		3	3				3		
CO2				3			3	2				3		
CO3		2	3				2	3				3		
CO4		3	3		2		3	3				1		

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module-1: Basic Ideas of Environment &Ecology, Environmental Geology &Microbiology,

Multidisciplinary nature of environmental studies, Definition, scope and importance Need for public awareness.

Module-2: Renewable and non-renewable resources: Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Module 3: Ecosystems in INDIA: Basic Concept of an ecosystem, Structure and function of an ecosystem, Energy Flow in Ecosystem, Ecosystem, Biogeochemical Cycles, Nitrogen Cycle, Biodiversity, Biodiversity Hotspots in India, IUCN Red List Conservation of Biodiversity, Importance of Biodiversity, Loss of Biodiversity, Causes of Loss of Biodiversity, Food chains, food webs and ecological pyramids.

Biosphere Reserves in India, Tiger Conservation of India Wildlife, Protection Act 1972, Climate Change in India Alien Invasive Species, Paris Agreement, UNFCCC, Kyoto Protocol,AlbedoofEarth,NationalGreenTribunalMontrealProtocol,KigaliAgreement,Green House Gases (GHGs), Air Pollutants Central Board, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans ,estuaries) National Health Mission, National Action Plan on Climate Change, National Water Mission, National Mission for Sustaining Himalayan Ecosystem (NMSHE), National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, Green India Mission

Module-5: Environmental Pollution: Environmental ethics, Cause, effects and control of: -Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, global warming, acid rain, Climate change, ozone layer depletion, nuclear accidents and holocaust. Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

Module-7: **Social Issues and the Environment:** Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns.

Module 8: Human Population and the Environment: Population growth, variation among nations, Population explosion–Family Welfare Program, Environment and

human health, Human Rights, Value Education, Women and Child Welfare, Role of Information Technology in Environment and human health, Virus and vaccination.

Text Books

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,India,
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw HillInc.
4. Clark R.S., Marine Pollution, Clanderson Press Oxford(TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T.2001,
6. Environmental Encyclopedia, Jaico Publ. House, Mumbai,
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment(R)
9. Indian Natural History, Bombay Natural History Society,

Essential Studies for Professionals-V

BTHESP501

L-T-P: 0-0-0.5

Credits: 0.5

Pre-requisite: Basic concepts in mathematics and English Language.

Introduction: This course examines basic English language and math. The Topics to be covered (tentatively): The course is on GATE exam preparation, logical reasoning, English sentence correction, English, Grammar correction, basic arithmetic, Vocabulary, Verbal Reasoning.

Course Outcomes (CO):

In this course we will study the basic components of math and English language. Students are expected to be capable of understanding the better communication, their advantages and drawbacks.

To reach this goal, the following objectives need to be met:

CO1: Students would be able to know GATE exam preparation.

CO2: Students would be able to implement verbal and non-verbal communication.

CO3: By analyzing the logic of any arithmetic structure able to solve problem.

CO4: To become an efficient math and English language.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		3							3		
CO2	3			3								2		
CO3	3	2	3									3		
CO4	3	3	3		1							3		

3 – High; 2 – Medium; 1 – Low

Course Contents:

Section A: Employment Enhancement Skills-V
Stream wise GATE Preparation

Section B: Skill Development for Professional-V

Module1: Vocabulary: Vocabulary questions test the candidate's knowledge in English like primary meanings of words, idioms, and phrases, secondary shades of meaning, usage, associated words, antonyms.

Module-2: Grammar: Grammar-based questions test the candidate's capability to mark and correct grammatical errors. Prepositions use of modifiers, subject-verb agreement, parallel construction, phrasal verbs, redundancy, etc.

Module-3: Verbal Reasoning: Verbal Reasoning questions are designed to test the candidate's potential to identify relationships or patterns within sentences or a group of words.

Module-4: Inequalities, Coding – Decoding, Syllogisms, Ranking/ Ordering, Blood Relations, Directions, Input-Output, Seating Arrangement, Puzzles , Decision Making, Analogy, Odd-Man out, Word Formation, Digit Sequence, Critical Reasoning, Statements & Assumptions, Statement & Conclusion, Strong Argument &Weak Arguments.

Learning Materials:

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA Mc Graw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON
4. Engineering Mathematics-Pearson
5. GATE Mathematics- Willey/McGraw-Hill