CIVIL ENGINEERING

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, UTTAR PRADESH, LUCKNOW

EVALUATION SCHEME & SYLLABUS

FOR

B. TECH. FOURTH YEAR

CIVIL ENGINEERING

AS PER

AICTE MODEL CURRICULUM

[Effective from the Session: 2021-22]

CIVIL ENGINEERING

SEVENTH SEMESTER CIVIL ENGINEERING SESSION 2021-22

S.No	Subject Code	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KHU701/ KHU702	HSMC-1*/HSMC-2*	3	0	0	30	20	50		100		150	3
2		Departmental Elective -IV	3	0	0	30	20	50		100		150	3
	KCE 070	Railway, Waterway and Airway Engineering											
	KCE 071	Sustainable Construction Methods											
	KCE 072	Probability Methods in Civil Engineering											
	KCE 073	Advance Concrete Design											
	KCE 074	Solid Waste Management											
3		Departmental Elective -V	3	0	0	30	20	50		100		150	3
	KCE 075	Design of Steel Structures											
	KCE 076	Urban Transportation Planning											
	KCE 077	Geosynthetics and Reinforced Soil Structures											
	KCE 078	Irrigation and Water Resource Engineering											
	KCE 079	Disaster Preparedness and Management											
4		Open Elective-II	3	0	0	30	20	50		100		150	3
5	KCE751	Concrete Lab	0	0	2				25		25	50	1
6	KCE752	Mini Project or Internship Assessment*	0	0	2				50			50	1
7	KCE753	Project	0	0	8				150			150	4
8		MOOCs (Essential for Hons. Degree)											
		Total	12	0	12							850	18

NOTE:

1. **Regular classroom interaction with industry experts is to be ensured in all theory courses (minimum two expert talks from relevant Industry).**
2. **Working on experiments using virtual labs is to be ensured in lab courses.**
3. **Student's visit to Industry/Industry Expert's project site must be arranged as & when possible.**
4. **The Mini Project or Internship (4 - 6 weeks) conducted during semester break after VI semester will be assessed during VII semester.**
5. **Project work is to be identified during VI semester, Initiated in VII semester (KCE 753) and completed in VIII semester (KCE 851).**

EIGHTH SEMESTER CIVIL ENGINEERING SESSION 2021-22

CIVIL ENGINEERING

S.No	Subject Code	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KHU801/ KHU802	HSMC-1* / HSMC-2*	3	0	0	30	20	50		100		150	3
2		Open Elective-III	3	0	0	30	20	50		100		150	3
3		Open Elective -IV	3	0	0	30	20	50		100		150	3
4	KCE851	Project	0	0	18				100		300	400	9
5		MOOCs (Essential for Hons. Degree)											
		Total	9	0	18							850	18

B. Tech (IV Year) VII Semester

Syllabus

ELECTIVE IV

KCE070	Railway, Waterway and Airway Engineering	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Explain the importance of railway infrastructure.
2. Identify the factors governing design of railway infrastructures.
3. Analysis and design the railway track system.
4. Understand the concepts of airport engineering and design components of airport.
5. Associate with the concepts of water transport system.

Unit	*Topics*	Lectures
I	Introduction to Permanent Way and its Components: History and administrative setup of Indian Railways; Rails, Type of rails, rail gauges, permanent way formation,– functions, requirements, sections in embankment and cutting (single/double track), electrified tracks, locomotives, wheel and axle arrangement, coning of wheels, defect in rails, rail fastenings, Fish plates, spikes, chairs, keys, bearing plates. Sleepers, Timber, steel, cast iron, concrete and prestressed concrete sleepers, sleeper density, ballast: material, specifications.	8
II	Track Geometrics, Turnouts and Crossings, Stations and Yards: Railway alignment, vertical alignment – gradients and grade effects, horizontal alignment – horizontal curves, super-elevation, concepts of cant excess and deficiency, safe permissible speed, transition curves, widening of gauges and track clearances, points and crossings – terminologies, types of turnouts, design of turnouts, types of crossings, design of crossings. Different types of stations and Yards: classification and functioning.	8
III	Signaling and Interlocking, Urban Railways: Classification of Signals, method of train working, absolute block system, Centralized train control system, ATS, interlocking of track, principle of interlocking, types of interlocking, high speed track – track requirement, speed limitations, high-speed technologies, Urban railway- railway system in urban areas.	8
IV	Introduction to Airport Engineering. Aircraft characteristics affecting airport planning &design, selection of site for an airport. Airports - layout and orientation, Runway and taxiway design consideration and geometric design. Airport drainage management, Zoning laws, Visual aids and air traffic control, Runway lighting, Runway operation Helipads, hangers, service equipment.	8
V	Water Transport Harbors and ports, Types of Harbours; Harbours - layouts, shippin glanes, anchoring, location identification; Littoral transport with erosion and deposition; sounding methods; Dry and Wet docks, components and operational Tidal data and analyses. Inland waterways: advantages and disadvantages; Development in India. Inland water operation.	8

Text Books

1. A Text Book of Railway Engineering by S. P. Arora & S. C. Saxena
2. Railway Engineering by M. M. Agrawal.

References

1. Railway Engineering by Rangwala (Charotar Publishing House).
2. Airport Engineering by Rangwala (Charotar Publishing House).
3. Airport Planning & Design by Khanna , Arora & Jain Nem Chand & Brothers).
4. Docs &Harbour Engineering by Bindra (Dhanpat Rai Publishing Company).

KCE071	Sustainable Construction Methods	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Classify the sustainable construction materials.
2. Apply cutting-edge construction technologies.
3. Evaluate different sustainable construction methods.
4. Apply different rating systems of construction/buildings as a professional.
5. Apply life cycle approach to optimize the performance of green construction materials

Unit	*Topics*	Lectures
I	Types of foundations and construction methods. Basics of Formwork and Staging. Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls). Modular construction methods for repetitive works.	8
II	Precast concrete construction methods. Basics of Slip forming for tall structures. Basic construction methods for steel structures. Basics of construction methods for Bridges.	8
III	dentification of cutting-edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative environmental impacts of construction activity.	8
IV	Study and evaluation of current LEED and GRIHA rating for construction system. Detailed case study and analysis of highly successful recent "green construction projects". Guidance to students for the LEED Green Associate professional licensing examination.	8
V	Environmental impact of materials; life-cycle assessment; material selection to optimize performance; design, evaluation, and production of green construction materials.	8

References

1. **Rebecca L. Henn; Andrew J. Hoffman (2013),** Constructing Green the Social Structures of Sustainability (Urban and Industrial Environments), **MIT Press.**
2. Steve Goodhew Sustainable Construction Processes: A Resource Text ISBN: 978-1-405-18759-6 May 2016 Wiley-Blackwell.
3. Kim S. Elliott, Precast Concrete Structures – 12 June 2019, CRC Press Taylor and Francis.
4. S.B.Marinković, Life cycle assessment (LCA) aspects of concrete, Woodhead Publishing Series in Civil and Structural Engineering 2013, Pages 45-80

KCE072	Probability Methods in Civil Engineering	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Apply probabilistic techniques for the analysis of complex Civil Engineering structures using advanced techniques.
2. Demonstrate mathematical and statistical knowledge and skills to be applied in various civil engineering structures.
3. Apply the laws of logic to mathematical statements.
4. Develop mathematical thinking in the conduct of different experiments and presentation of results precisely.

Unit	*Topics*	Lectures
I	Introduction: Role of Probability in Civil Engineering Problems, Random Events: Definition of basic random events; Application of set theory in definition of composite event operations; Probability of events and definition of probability axioms; Solution of real life examples from Civil Engineering.	8
II	Random Variables: Definition of random variables – discrete and continuous; Probability definitions – PMF, PDF, CDF; Moments and expectations. Functions of Random Variables: Definition of probability distributions of functions of single random variables – exact methods and approximate methods; Moments and expectations of functions – direct and indirect methods.	8
III	Multiple Random Variables: Definition of joint, marginal, and conditional probability distributions; Definitions of moments and expectations, including the definition of correlation coefficient; Functions of multiple random variables.	8
IV	Common Probability Models: Discrete random variables – binomial distribution, Poisson's distribution; Continuous random variables – exponential distribution, gamma distribution; Central limit theorem; Normal and lognormal distributions.	8
V	Statistics and sampling: Goodness of fit tests; regression and correlation analyses; estimation of distribution parameters from statistics; hypothesis testing and significance; Bayesian updating of distributions.	8

References

1. Papoulis, A, and S. U. Pillai (2002), Probability, Random Variables and Stochastic Processes,McGraw-Hill, New York.
2. Richard A. Jonson and C. B. Gupta (2005), Miller and Freund's Probability and Statistics forEngineers, Pearson Education, Inc., United States.
3. West M. and J. Harrison (1997), Bayesian Forecasting and Dynamic Models, Springer-Verlag,New York.
4. Ang, A. H-S., and Tang, W., H. "Probability concepts in engineering: Emphasis on applications incivil and environmental engineering." Wiley.
5. Kottegoda, N. T., and Rosso, R. "Applied Statistics for Civil and Environmental Engineers."Wiley.
6. Ross, S. "A first course on probability." Prentice Hall.

KCE073	Advance Concrete Design	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Understand the design criteria as well as design concept of circular and rectangular tanks.
2. Design the Intz tank, RC domes and beams, cylindrical and rectangular tanks.
3. Understand the concept of pre tensioning and post tensioning and different systems used in pre tensioning.
4. Analysis and design the simple prestressed beams .
5. Design deep beams and corbel as per IS 456.

Unit	*Topics*	Lectures
I	Introduction to liquid retaining structures, design criteria, material specifications and permissible stresses for tanks, design concept of circular and rectangular tanks situated on the ground and underground.	8
II	Design of over-head tanks: design of RC domes and beams curved in plan, design ofcylindrical and rectangular tanks with different end conditions using IS: 3370 tables, Intze tank design based on membrane analysis with mention of continuity effects.	8
III	ntroduction to prestressing, assumptions, general principles, advantages of prestressing, Axially placed tendons, bent tendons, parabolic tendons, load balancing concept, pressure line, systems of prestressing, pretensioning and post tensioning, Hoyer system, Freyssinet system,LeMccallsystem, Magnel-Blaton system, Gifford-Udall system, C.C.L standard system.	8
IV	Losses in prestress, IS 1343 recommendations for prestressed concrete, stages of loading tobe considered in design, handling and transportation of precast prestressed concrete beams, analysis and design of simple prestressed beams, Lever arm conception, kern distance.	8
V	Introduction to deep beams, minimum thickness, design of deep beams by IS 456, check forlocal failures, detailing of deep beams, Introduction to Corbels, Shear friction, Corbel dimensions, design of a corbel.	8

References

1. IS: 456 – 2000, “Code of Practice for Plain and Reinforced Concrete”, Bureau of Indian Standards, New Delhi.
2. IS 3370-2009, “Indian Standard concrete structures for storage of liquids - code of practice”, Bureau of Indian Standards, New Delhi
3. IS 1343-2012, “Indian Standard prestressed concrete - code of practice”, Bureau of Indian Standards, New Delhi
4. Shah. H.J.., “Reinforced Concrete Vol : 2”, Charotar publishing house Pvt. Ltd.
5. Varghese P.C. “Advanced Reinforced concrete design”, PHI learning Pvt. Ltd.
6. Ramamrutham S. and Narayan R. “Design of Reinforced Concrete Structures”, Dhanpat Rai Publishing company Pvt. Ltd.
7. Jain, A.K., “Reinforced Concrete: Limit State Design”, Nem Chand & Bros., Roorkee.
8. Punmia B.C, Jain A.K., “Limit State Design of Reinforced Concrete”, Laxmi Publications Pvt. Ltd.

KCE074	Solid Waste Management	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Understand the concept of solid waste management.
2. Explain handling and processing of solid waste.
3. Apply the concept of landfilling for disposal of solid waste.
4. Design composting and other solid waste conversion units.
5. Understand the various hazardous waste, risk assessment and legislation

Unit	*Topics*	Lectures
I	Solid waste: Public health and ecological impacts, Sources and types of solid wastes, material flow and waste generation, Functional elements: Waste generation, storage, collection, Transfer and transport, processing and recovery, disposal. Physical and chemical composition of municipal solid waste, integrated solid waste management, hierarchy of waste management options, different methods for generation rates. Storage: movable bins, fixed bins. Collection: home to home collection, community bin system. Theory and design of hauled container system, stationary container system.	8
II	Transportation: handcart, tri-cycle, animal cart, tripper truck, dumper placer, bulk refuse carrier, railroad transport, water transport, conveyors, layout of routes. Engineering system for on-site handling and processing of solid waste: separators, size reduction equipments, screening equipments, densification, baling, cubing, pelleting equipments.	8
III	Land filling: Site selection criteria, landfill layout, landfill sections, Occurrence of gases and leachate in landfills: composition and characteristics, generation factors, initial adjustment phase, transition phase, acid formation phase, methane formation phase, maturation phase of gases and leachate, Introduction to engineered landfills.	8
IV	Composting, types of composting, process description, design and operational consideration of aerobic composting, process description, design and operational consideration of anaerobic composting. Thermal conversion technologies: incineration and pyrolysis system, energy recovery, system. Overview of solid waste management practices in India.	8
V	Introduction to Hazardous wastes, Definition of Hazardous waste, The magnitude of the problem; Hazardous waste: Risk assessment, Environmental legislation, Characterization and site assessment, Waste minimization and resource recovery, Transportation of hazardous waste, Disposal of hazardous waste. Introduction to Electronic waste and Biomedical waste and their disposal.	8

References

1. Tchobanoglous, G., Theisen, H., & Vigil, S.A; Integrated Solid Waste Management: McGraw Hill,New York
2. Solid Waste Engineering, Principle & Management issues by Ven Te Chow
3. Bhide, A.D., B.B. Sundaresan, Solid Waste Management in developing countries.
4. Manual on Municipal solid Waste Management, CPHEEO, Govt. of India.

5. Guidelines for Management and Handling of Hazardous wastes MOEF (1991), Govt. of India.
6. Datta, M; Waste Disposal in Engineered Land fills, Narosa Publishers, Delhi.
7. Waste Management "Asian and Pacific Center for Transfer of Technology (N.D.) India", September1993.
8. Solid and Hazardous Waste Management: Science and Engineering by M.N. Rao, Razia Sultana &Sri Harsha Kota
9. E-Waste Management: From Waste to Resource by RamzyKahhat, Klaus Hieronymi, EricWilliams.
10. Biomedical Waste Management by R. Radhakrishan
11. Electronic Waste Management (Issues in Environmental Science and Technology) by R. E.Hester , R. M. Harrison & Martin T. Goosey

ELECTIVE V

KCE075	Design of Steel Structures	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Understand properties of steel and types of loads acting on steel structures.
2. Design welded and bolted type of connections for elementary steel structures.
3. Design tension members for elementary steel structures.
4. Design compression members such as simple columns, braced and latticed columns and column bases.
5. Design flexural members such as beams, purlins and girders

Unit	*Topics*	Lectures
I	**General Considerations:** Introduction, Advantages of Steel as a Structural. Material, Disadvantages of Steel as a Structural Material, Structural Steel, Stress-Strain Curve for Mild Steel, Rolled Steel Sections, Convention for Member Axes, Loads, Dead Load, Live Loads, Environmental Loads, Seismic Forces, Snow and Rain Loads, Erection Loads, Basis for Design, Design Philosophies, Local Buckling of Plate Elements. **Introduction to Limit State Design:** Introduction, Limit States for Steel Design, Limit States of Strength, Limit States of Serviceability, Actions(Loads), Probabilistic Basis for Design, Design Criteria	8
II	**Simple Connections-–Riveted, Bolted and Pinned Connections:**Introduction, Riveted Connections, Patterns of Riveted Joints, Bolted Connections, Types of Bolts, Types of Bolted Joints, Load Transfer Mechanism, Failure of Bolted Joints, Specification for Bolted Joints,Bearing-Type Connections, Prying Action, Tensile Strength of Plate, Efficiency of the Joint, Combined Shear and Tension, Slip-Critical Connections, Combined Shear and Tension for Slip-Critical Connections, Working Load Design, Design of eccentric bolted connections. **Simple Welded Connections:**Introduction, Types, Symbols, Welding Process, Weld Defects, Inspection of Welds, Assumptions in the Analysis of Welded Joints, Design of Groove Welds, Design of Fillet Welds, Fillet Weld Applied to the Edge of A Plate Or Section, Fillet Weld for Truss Members, Design of Intermittent Fillet Welds, Plug and Slot Welds, Stresses Due To Individual Forces, Combination of Stresses, Failure of Welds, Distortion of Welded Parts, Fillet Weld Vs Butt Weld, Welded Jointed Vs Bolted and Riveted Joints, Design of eccentric welded connections, Working Load Design.	8
III	**Tension Members:** Introduction, Types of Tension Members, Net Sectional Area, Effective Net Area, Types of Failure, Design Strength of Tension Members, Slenderness Ratio (λ), Displacement, Design of Tension Member, Lug Angles, Splices, Gusset Plate, Working Load Design.	8

IV	**Compression Members:** Introduction, Effective Length, Slenderness Ratio (λ), Types of Sections, Types of Buckling, Classification of Cross Sections, Column Formula, Design Strength, Design of Axially Loaded Compression Members,Built-Up Columns (Latticed Columns), Lacing, Batten, Compression Member Composed of Two Components Back-to-Back, Splices, Design of Column Bases.	8
V	**Beams:** Introduction, Types of Sections, Behavior of Beam in Flexure, Section Classification, Lateral Stability of Beams, Lateral-Torsional Buckling, Bending Strength of Beams, Laterally Supported Beams, Laterally Unsupported Beams, Shear Strength of Beams, Web Buckling, Bearing Strength, Web Crippling, Deflection, Design Procedure of Rolled Beams, Built-Up Beams (Plated Beams), Purlins, Beam Bearing Plates, Effect of Holes in Beam, Introduction to Plate Girder , Introduction to Gantry Girder.	8

Text Books

1. Design of Steel Structures by N. Subramanian, Oxford University Press
2. Limit State Design of Steel Structures by S. K. Duggal, Tata Mcgraw Hill.
3. Design of Steel Structures by K S Sairam, Pearson Education
4. Design of Steel Structures by S Ramamurtham, DhanpatRai Publishing Company.

Reference Books

1. Steel Structures by Robert Englekirk. Hohn Wiley & sons inc.
2. Structural Steel Design by Lambert tall (Ronald Press Comp. Newyork.
3. Design of steel structures by Willam T Segui , CENGAGE Learning
4. Structural Steel Design By D MacLaughlin , CENGAGE Learning

KCE076	Urban Transportation Planning	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Understand the basic concepts of planning at urban and regional levels.
2. Distinguish between the Conventional and current approaches for travel demand estimation.
3. Implement various types of models and trip generation.
4. Analyze the urban travel markets.
5. Evaluate the transport planning proposals.

Unit	*Topics*	Lectures
I	Introduction to transportation planning, planning concept, Goals, objective and Importance of transportation planning. Nature of traffic problems in cities. Present Scenario of road transport and rail transport assets. Role of transportation: Social, Political, Environmental. Transport and Socioeconomic Activities, Historical Development of Transport, Transportation in the Cities, Freight Transportation, Future Developments.	8
II	Urban form and Transport patterns, land use – transport cycle, concept of accessibility. Types of transport systems, evolution of transport modes, transport problems and mobility issues. Public Transport: Intermediate Public Transport (IPT) Rapid and mass transport system like MRTS & bus rapid transit. Transport Planning Process, Problem Definition, Solution Generation.	8
III	Travel demand: Estimation and fore casting, trip classification, trip generation: factor and methods, multiple regression analysis. Trip distribution methods, modal split, trip assignment.	8
IV	Studying travel behavior. Analyzing urban travel markets. Traffic and transportation surveys and studies, traffic and travel characteristics, urban transport planning process – stages, study area, zoning, database.	8
V	Evaluation of transport planning proposals: Land Use Transport Planning, Economic Evaluation methods like Net present Value methods, Benefit Cost method. Transport system management: Long term and short term planning.	8

Text Book:

1. Khanna S. K., Justo C.E.G, &Veeraragavan, A. “Highway Engineering”, Nem Chand and Bros., Roorkee-247 667.
2. Kadiyali L. R., & Lal, N.B. “Principles and Practices of Highway Engineering (including Expressways and Airport Engineering)”, Khanna Publications, Delhi – 110 006

References:

1. Introduction to Transportation Engineering: William W. Hay.
2. Introduction to Transportation Engineering planning- E.K. Mortak.
3. Metropolitan Transportation planning-J.W. Dickey.
4. Traffic Engineering, L.R. Kadiyali
5. Hutchinson, B.G.(1974).Principles of Urban Transport Systems Planning. Mc Graw Hill Book Company, New York.
6. John W.Dickey. (1975). Metropolitan Transportation Planning. Mc Graw Hill Book Company, New York.

KCE077	Geo-synthetics and Reinforced Soil Structures	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Identify the type of Geosynthetic and their relevance.
2. Analyze &compute different properties of Geosynthetics.
3. Understand the emerging trends of Geosynthetic in geotechnical applications.
4. Design the Reinforced Earth Walls using Geosynthetic material.
5. Design the Reinforced Foundation using Geosynthetic materials.

Unit	*Topics*	Lectures
I	Introduction to Geosynthetics, types of geosynthetics, artificial and natural geosythetics and their applications, manufacture of geosynthetics, strength of reinforced soils, testing of Geosynthetics	8
II	Drainage application of geosynthetics, filtration applications of geosynthetics, erosion control using geosynthetics. Geosynthetics in flexible payment, introduction to geosyenthitcs in landfills, geosynthetics for construction of landfills.	8
III	Sustainable infrastructure development, different types of soil retaining structures, design codes for reinforced soil retaining walls, construction aspects of geosythetics reinforced soil retaining wall, testing requirements for reinforced soil retaining walls, geosynthetic reinforced soil embankments.	8
IV	Design of reinforced soil retaining walls – simple geometry, design of reinforced soil retaining walls – sloped backfill soil, soil embankments supported on geocell mattresses, geosynthetic reinforced pile systems for high embankments	8
V	Reinforced soil for supporting shallow foundations, response of footings resting on reinforced foundation soils, bearing capacity analysis of footings resting on reinforced foundation soils, carbon footprint analysis	8

References

1. Koerner, R.M. "Designing with Geosynthetics", Prentice Hall, New Jersey, USA, 4th edition, 1999.
2. Jewell, R.A., "Soil Reinforcement with Geotextiles", Special Publication No. 123,CIRIA, Thomas Telford. London, UK, 1996.
3. Geosynthetics - New Horizons, Eds. G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana,Asian Books Private Ltd., New Delhi, 2004.
4. Hoe I. Ling, Guido Gottardi , Daniele Cazzuffi , Jie Han , Fumio Tatsuoka “Design andPractice of Geosynthetic-Reinforced Soil Structures”
5. Sanjay Kumar Shukla, Erol Guler “Advances in Reinforced Soil Structures”

KCE078	Irrigation and Water Resource Engineering	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Describe the components of hydrological cycle, evaporation process and consumptive use.
2. Apply the knowledge of stream flow measurement techniques and hydrograph theory for computation of run-off.
3. Design different types of irrigation channels and water logging preventive measures.
4. Design the regulatory and control systems of canal and irrigation outlets.
5. Apply the knowledge of ground water hydrology and determination of discharge through wells.

Unit	*Topics*	Lectures
I	Hydrology: Hydrologic Cycle. Water Budget Equation, Hydrologic system, Precipitation : Types, measurements and analysis, error in estimation, missing data, consistency of rainfall records, Intensity during frequency (IDF) and probabilistic maximum Precipitation(PMP) curves. Evaporation and consumptive use: Process affecting factors, estimation, and measurement techniques. Infiltration**:** Process affecting factors, measurement and estimation, Infiltration Indices	8
II	Surface Runoff: Components and factors affecting runoff, methods of estimation of runoff volume and peak runoff, rating curve, Rainfall – runoff relationships Hydrograph analysis: components, factors affecting hydrographs, base flow separation, Direct Runoff Hydrograph, Unit Hydrograph: Theory and assumptions. Derivation of Unit Hydrograph, Synthetic Unit Hydrograph Introduction to computer models for rainfall runoff analysis. Irrigation: Developments in India, Necessity and types Advantages & disadvantages of irrigation. Functions of water in plant growth, Methods of Irrigation, Water requirement of crops. Irrigation frequency, Irrigation efficiencies, Principal crops and crop season, crop rotation. Canal irrigation: Classes and alignment, Parts of a canal system, Commanded area, curves in channels, channel losses.	8
III	Sediment Transportation: Suspended and Bed load and its estimation Irrigation channels: Types: lined and unlined, silt theories: Kennedy's and Lacey's Design procedure for irrigation channels, Longitudinal cross section, Schedule of area statistics and channel dimensions, use of Garret's Diagrams in channel design, cross sections of anIrrigation channel, Computer programs for design of channels Lining of Irrigation Canals: Advantages and types, factors for selection of a particular type, design of lined channels, cross section of lined channels, Economics of canal lining. Water Logging: Definition, effects, causes and	8

	anti-water logging measures, Drainage of water logged land, Types of drains open and closed, spacing of closed drains.	
IV	Regulation and control of canal system: Purpose, Types of canal regulation works and their functional aspects Irrigation Outlets: Requirements, types, non-modular, semi-module and rigid module, selection criterion River Training: Objective and need, classification of rivers, and river training works, meandering, stages, methods of river training, bank protection, Methods for measurement of discharge.	8
V	Ground Water Hydrology: Zones of underground water, Aquifers and their types, important terms, Determination of discharge through unconfined and confined aquifers with steady flow conditions, Interference among wells, determination of aquifer constants, Well loss and specific capacity, efficiency of a well, types of water wells, bored and open wells, specific yield of a well, Relative merits of well and canal irrigation, type of tube wells, well surrounding and well development, Suitable site selection for tube well, Types of open wells, Methods of lifting water. Infiltration galleries.	8

Text Book

1. Irrigation Engg. and Hydraulic Structures by S.K. Garg, Khanna Publishers.
2. Irrigation and water Power engineering by B.C. Punmia, Laxmi Publications.
3. Engineering Hydrology by K. Subramanya, TMH.
4. Irrigation Water Power and Water Resource Engg. by K.R. Arrora.
5. Water resource engineering by Ralph A. Wurbs& Wesley P. James, Pearson Publication.

References

1. Water Resources Engg. By Larry W. Mays, John Wiley India
2. Water resources Engg. By Wurbs and James, John wiley India
3. Water Resources Engg. By R. K. Linsley, McGraw Hill
4. Irrigation and water Resources Engg. By G L Asawa, New age International Publishers
5. Irrigation Theory and practices by A.M. Michel.
6. Fundamental of Hydraulic Engineering System by Houghalen, Pearson Publication.

KCE079	Disaster Preparedness and Management	3L:0T:0P	3Credits

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Understand the basic concepts of disasters and hazards
2. Classify the natural disasters.
3. Analyze the impacts of disaster on various societal components
4. Understand the components of disaster management cycle and roles of various agencies its risk reduction
5. Understand the process of recovery, reconstruction and development methods

Unit	*Topics*	Lectures
I	Introduction-Concepts and definitions: disaster, hazard, vulnerability, risks-severity, frequency and details, capacity, impact, prevention, mitigation.	8
II	Disasters-Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.	8
III	Disaster Impacts-Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.	8
IV	Disaster Risk Reduction (DRR)-Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.	8
V	Disasters, Environment and Development-Factors affecting vulnerability such asimpact of developmental projects and environmental modifications (including of dams, land-use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.	8

Text/Reference Books:

1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
3. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
4. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
5. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
6. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
7. Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

KCE 751	Concrete Lab	0L:0T:2P	1 Credits

1. Study of IS codes for (i) Aggregates (ii) Cements (iii) Admixtures (iv) Fly ash
2. Concrete Mix design computation by ACI 211.1-91 method, IS code method as per 10262-2019 & 456-2000, DOE method for given sample.
3. Preparation and testing of samples as per any one of the above mentioned computations (Minimum grade of concrete is M30)
4. Tests on Concrete- (a) Workability tests - Slump cone test, compaction factor test, Vee-bee consistometer test, flow table test. (b) Strength tests- compressive strength, flexural strength, split tensile strength.
5. Effects of Admixture - Accelerator, Retarder, Super Plasticizer.
6. Non destructive Testing - Rebound Hammer test, Ultrasonic Pulse Velocity test.

References:

1. Concrete Technology – A.M. Neville & J. J. Brooks , Pearson
2. Concrete Technology Theory & Practice-M.S. Shetty, S. Chand Publishers
3. Concrete Technology Theory & Practice-M.L. Gambhir, TMH Publishers
4. IS:10262-2019-Concrete Mix Proportioning Guidelines

KCE 752	Mini Project / Internship Assessment	0L:0T:2P	1 Credits

- Students will be asked to work upon minimum four of the following topics during the semester.
- They will submit the report of each topic containing following information (as per need of topic) like: introduction, general information, usage/application (if any) detailed description of work/process, relevant diagrams, drawings & tabulation (if any),observation and results (as applicable) or any other relevant information as per topic.

1. Work related to preparation of bill of quantity & tender document.
2. Work related to design & drawing of flat slab using IS code method.
3. Work related to cost estimation of (including market survey of rates by students) building/earthwork for a highway.
4. Work related to scheduling of activities of a project using relevant software
5. Work related to preparation of layout plan of a building and its marking on ground.
6. Design & analysis of a G+5 residential building using structural design and analysis software like STAAD Pro/STRUDS/SAP/ETAB/STRAP.
7. Work related to design of a small sewage treatment plant (STP) unit for a residential society.
8. Work related to computation of surface runoff & design of rain water harvesting system forgiven area (relevant software may be used for runoff computation).