COURSE STRUCTURE & DETAILED SYLLABUS

ACE - R20

CIVIL ENGINEERING

B. TECH FOUR YEAR DEGREE COURSE

STRUCTURE & SYLLABUS

(2020 Batch)

IV Year I Semester

ACE

Engineering College

Ankushapur(V), Ghatkesar(M) - 501 301

(An Autonomous Institution, Affiliated to JNTUH ,Hyderabad)

ACE
Engineering College
Ankushapur(V), Ghatkesar(M), Medchal.Dist - 501 301
(Autonomous)

B.TECH. FOUR YEAR DEGREE COURSE
CIVIL ENGINEERING
COURSE STRUCTURE
IV Year I Semester

IV Year							I Semester
S.No.	Course Type	Course Code	Course Title	Periods Per Week			Credits
				L	T	P	
1	PCC	CE701PC	Estimation, Costing and Project Management	3	1	0	4
2	PCC		Professional Elective –III	3	0	0	3
3	PCC		Professional Elective –IV	3	0	0	3
4	BSC		Open Elective –II	3	0	0	3
5	PCC	SM701MS	Professional Practice law & Ethics	2	0	0	2
6	PCC	CE703PC	Industrial Oriented Mini Project/ Summer Internship	0	0	4	2*
7	PCC	CE704PC	Seminar	0	0	3	1
8	PCC	CE705PC	Project Stage - I	0	0	7	3
Total				**14**	**1**	**14**	**21**

Note: Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation between 6th and 7th semesters. Students should submit report of Industrial Oriented Mini Project/ Summer Internship for evaluation.

Professional Elective – I

CE511PE	Concrete Technology
CE512PE	Theory of Elasticity
CE513PE	Rock Mechanics

Professional Elective – II

CE611PE	Prestressed Concrete
CE612PE	Elements of Earth Quake Engineering
CE613PE	Advanced Structural Analysis

Professional Elective-III

CE711PE	Remote Sensing &GIS
CE712PE	Ground Improvement Techniques
CE713PE	Advanced Structural Design

Professional Elective -IV

CE721PE	Irrigation and Hydraulic Structures
CE722PE	Pipeline Engineering
CE723PE	Ground Water Hydrology

Professional Elective –V

CE811PE	Solid Waste Management
CE812PE	Environmental Impact Assessment
CE813PE	Air pollution

Professional Elective -VI

CE821PE	Airports, Railways and Waterways
CE822PE	Urban Transportation Planning
CE823PE	Finite Element Methods for Civil Engineering

Open Elective – I

CE600OE	Disaster Preparedness & Planning Management (CE to Other Branches)
CS601OE	Fundamentals of Management For Engineers (Open Elective - I) (H&S to CE)
CS600OE	Entrepreneurship
CS602OE	Cyber Law & Ethic
EI600OE	Basics of Sensors Technology
EC600OE	Fundamentals of Internet of Things
EE600OE	Reliability Engineering
EE601OE	Renewable Energy Sources
ME600OE	Quantitative Analysis for Business Decisions

Open Elective – II

CE700OE	Remote Sensing & GIS (CE to Other Branches)
CS700OE	Data Structures (Open Elective - II) (CSE to CE)
CS701OE	Artificial Intelligence
CS702OE	Python Programming
CS703OE	Java Programming
EI700OE	Fundamentals of Biomedical Applications
EC700OE	Electronic Sensors
EE700OE	Utilization of Electrical Energy
EE701OE	Electric Drives and Control
ME700OE	Basic Mechanical Engineering

Open Elective – III

CE800OE	Environmental Impact Assessment (CE to Other Branches)
EE800OE	Basics of Power Plant Engineering
CS800OE	Machine Learning
CS801OE	Mobile Application Development
CS802OE	Scripting Languages
CS803OE	Database Management Systems
EI800OE	Basics of Virtual Instrumentation
EC800OE	Measuring Instruments
EE801OE	Energy Sources and Applications
ME800OE	Non-Conventional Sources of Energy (Open Elective - III) (ME to CE)

CE701PC: ESTIMATION, COSTING AND PROJECT MANAGEMENT

B.Tech. IV Year I Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
CE701PC	PCC	L	T	P	C	CIA	SEE	Total
		3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes:15	Practical Classes: 0				Total Classes: 60		
Prerequisite: Building materials & Auto Cad Lab-1								

Course Objectives: The objective of this Course is:

The subject provide process of estimations required for various work in construction. To have knowledge of using SOR & SSR for analysis of rates on various works andbasics of planning tools for a construction projects.

Course Outcome: On completion of the course, the student will be able to:

- understand the technical specifications for various works to be performed for a project andhow they impact the cost of a structure.
- quantify the worth of a structure by evaluating quantities of constituents, derive their costrates and build up the overall cost of the structure.
- understand how competitive bidding works and how to submit a competitive bid proposal.
- An idea of how to optimize construction projects based on costs
- An idea how construction projects are administered with respect to contract structures andissues.
- An ability to put forward ideas and understandings to others with effective communicationprocesses.

Unit: I	General items of work in Building	No. of Classes: 12

General items of work in Building – Standard Units Principles of working out quantities for detailed andabstract estimates – Approximate method of Estimating. Detailed Estimates of Buildings

Unit: II	Reinforcement bar bending and bar requirement	No. of Classes: 12

Reinforcement bar bending and bar requirement schedules Earthwork for roads and canals.

Unit: III	Rate Analysis	No. of Classes: 12
Rate Analysis – Working out data for various items of work over head and contingent charges		
Unit: IV	Contracts	No. of Classes: 12
Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation - Standardspecifications for different items of building construction.		
Unit: V	**Construction project planning**	No. of Classes: 12

Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts.

Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three-time estimates, analysis, slack computations, calculation of probability of completion

NOTE: NUMBER OF EXERCISES PROPOSED:

1. Three in flat Roof & one in Sloped Roof
   Exercises on Data – three Nos

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie
3. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications,2016
4. Chitkara, K. K. Construction Project Management. Tata McGraw-Hill Education, 2014.

Reference Books:

1. Standard Schedule of rates and standard data book by public works department.
2. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works– B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
4. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
5. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
6. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson EducationIndia, 2015.

Web References:

https://nptel.ac.in/courses/105/103/105103093/

E-Text Books:

https://drive.google.com/file/d/1TsG32d5bspMwx0xIoMsU5_Gn45amxMGk/view

CE711PE: REMOTE SENSING & GIS (PE – III)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CE711PE	PEC	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite: Geoinformatics

Course Objectives: The objectives of the course are to:

- Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digitalimages
- know the concept of Geographical Information System (GIS), coordinate system GIS Dataand its types
- Understand the students managing the spatial Data Using GIS.
- Understand Implementation of GIS interface for practical usage.

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

- **Describe** different concepts and terms used in Remote Sensing and its data
- Understand the Data conversion and Process in different coordinate systems of GIS interface
- **Evaluate** the accuracy of Data and implementing a GIS
- **Understand the applicability of** RS and GIS for various applications.

Unit: I	Concepts of Remote Sensing Basics of remote sensing	No. of Classes: 9

Concepts of Remote Sensing Basics of remote sensing- elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology & units, energy resources, energy interactions with earth surface features & atmosphere, atmospheric effects, satellite orbits, Sensor Resolution, typesof sensors. Remote Sensing Platforms and Sensors, **IRS satellites, Remote Sensing Data Interpretation Visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of soil, water and vegetation.**

Remote Sensing Data Interpretation Visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of soil, water and vegetation. Concepts of Digital image processing, image enhancements, qualitative & quantitative analysis and pattern recognition, classification techniques and accuracy estimation.

Unit: II	Introduction to GIS	No. of Classes: 9

Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, TheNature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Co- ordinate systems, Map projections, Map transformation, Geo-referencing,

Unit: III	Spatial Database Management System and data structures	No. of Classes: 9

Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system, entity-relationship model, normalization **Data models and data structures:** Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata.

Unit: IV	Spatial Data input and Editing, Analysis	No. of Classes: 9

Spatial Data input and Editing: Data input methods – keyboard entry, digitization, scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macrocomponents of accuracy, sources of error in GIS.

Spatial Analysis: Introduction, topology, spatial analysis, vector data analysis, Network analysis, raster data analysis, Spatial data interpolation techniques.

Terrain Analysis: Generation of Contours and analyzing them using software like QGIS, SURFER, ArcGIS.etc...

LiDAR (Light Detection And Ranging) – Principles and Properties -Application of LiDAR in land resources survey.

Unit: V	Implementing a GIS and Applications	No.of Classes: 9

Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems,decision making using GIS

Applications of GIS: GIS based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications.

Text Books:

1. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Press, 2nd Edition, 2011.
2. Introduction to Geographic Information systems by Kang-tsung Chang, McGraw Hill Education(Indian Edition), 7th Edition, 2015.
3. Fundamentals of Geographic Information systems by Michael N. Demers, 4th Edition, WileyPublishers, 2012.

Reference Books:

1. Remote Sensing and Image Interpretation by Thomas M. Lillesand and Ralph W. Kiefer, WileyPublishers, 7th Edition, 2015.\
2. Geographic Information systems – An Introduction by Tor Bernhardsen, Wiley India Publication,3rd Edition, 2010.
3. Advanced Surveying: Total Station, GIS and Remote Sensing by Satheesh Gopi, R.SathiKumar, N. Madhu, Pearson Education, 1st Edition, 2007.
4. Textbook of Remote Sensing and Geographical Information systems by M. Anji Reddy.

Web References:

https://nptel.ac.in/courses/105/108/105108077/

E-Text Books:

https://www.gisresources.com/wp-content/uploads/2013/09/anji-reddy_GIS.pdf

CE712PE: GROUND IMPROVEMENT TECHNIQUES (PE – III)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CE712PE	PEC	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite: Geo-Technical Engineering, Foundation Engineering

Course Objectives: The objectives of the course are to:

- To know the need of ground improvement
- To acquire the knowledge on the various ground improvement techniques available and theirapplications for different types of soils
- To understand suitable ground improvement technique for given soil conditions.

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

- Know the necessity of ground improvement
- Understand the various ground improvement techniques available
- Select & design suitable ground improvement technique for existing soilconditions in thefield.

Unit: I	Introduction to Engineering Ground Modification	No. of Classes: 9

Introduction to Engineering Ground Modification: Need and objectives, Identification of soil types, In situ and laboratory tests to characterize problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, and their applications.

Unit: II	Mechanical Modification	No. of Classes: 9

Mechanical Modification: Shallow Compaction Techniques- Deep Compaction Techniques- Blasting-Vibrocompaction- Dynamic Tamping and Compaction piles.

Unit: III	Hydraulic Modification	No. of Classes: 9

Hydraulic Modification: Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Electro-kinetic dewatering-Filtration, Drainage and Seepage control with Geosynthetics, Preloading and vertical drains,

Unit: IV	Physical and Chemical Modification	No. of Classes: 9

Physical and Chemical Modification – Modification by admixtures, Modification Grouting, Introductionto Thermal Modification including freezing.

Unit: V	Modification by Inclusions and Confinement	No.of Classes: 9

Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, and gridreinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

Text Books:

1. Hausmann, M. R. (1990) – Engineering Principles of Ground Modifications, McGraw Hillpublications

M. P. Moseley and K. Krisch (2006) – Ground Improvement, II Edition, Taylor and Francis.

Reference Books:

1. Koerner, R. M (1994) – Designing with Geosynthetics – Prentice Hall, New Jersey
2. Jones C. J. F. P. (1985) – Earth Reinforcement and soil structures – Butterworths, London.
3. Xianthakos, Abreimson and Bruce - Ground Control and Improvement, John Wiley & Sons,1994.
4. K. Krisch & F. Krisch (2010) - Ground Improvement by Deep Vibratory Methods, Spon Press,Taylor and Francis
5. Donald P Coduto – Foundation Design Principles and Practices, 2nd edition, Pearson, Indianedition, 2012.

Web References:

E-Text Books:

CE713PE: ADVANCED STRUCTURAL DESIGN (PE – III)

B.Tech. IV Year I Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CE713PE	PEC	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite: Structural Engineering I(RCC) & II(STEEL) and Structural analysis

Course Objectives: The objectives of the course are to:

To make the student more conversant with the design principles of critical structures using limit state approach.

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

- Enhance the capabilities to design the special structural elements as per Indian standard codeof practice.
- Analyze, design, draw and detailing of critical structural components with a level of accuracy.

Unit: I	Design and Detailing of cantilever	No. of Classes: 9

Design and Detailing of cantilever type of Retaining walls – Stability Check. Principles& Design ofCounter fort Retaining walls.

Unit: II	Flat slabs, Ribbed slabs	No. of Classes: 9

Flat slabs: Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat slabs-Check for one way and two way shears

Ribbed slabs: Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Designfor shear, Deflection, Arrangement of Reinforcements.

Unit: III	Design of RCC Circular Water Tanks	No. of Classes: 9

Design of RCC Circular Water Tanks .

Unit: IV	Introduction - Definition and basic forms	No. of Classes: 9

Introduction - Definition and basic forms – Components of a bridge - Classification of bridges – IRC Loading Standards and specifications - Design of Reinforced Concrete Slab Bridge decks.

Unit: V	Design of Steel Gantry Girders.	No.of Classes: 9

Design of Steel Gantry Girders.

Text Books:

1. Advanced RCC by Krishnam Raju, CBS Publishers & distributors, New Delhi.
2. Advanced RCC by Varghese, PHI Publications, New Delhi.
3. Structural Design and drawing (RCC and steel) by Krishnam Raju, Univ. Press, New Delhi
4. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications,New Delhi.

Reference Books:

1. RCC Designs by Sushil Kumar, standard publishing house.
2. Fundamentals of RCC by N.C. Sinha and S.K. Roy, S. Chand Publications, New Delhi.
3. N. Krishna Raju, Design of Bridges, Oxford & IBH Publishing Company Pvt. Ltd, New Delhi.Fourth edition 2009.

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Web References:

E-Text Books:

CE721PE: IRRIGATION AND HYDRAULIC STRUCTURES (PE – IV)

B.Tech. IV Year I Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
CE721PE	PEC	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite: Hydraulics, Hydrology &Water Resources Engineering

Course Objectives: The objectives of the course are to:

- To study various types of storage works and, diversion headwork, their components and design principles for their construction.

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

- Know types of water retaining structures for multiple purposes and its key parametersconsidered for planning and designing
- Understand details in any Irrigation System and its requirements
- Know, Analyze and Design of a irrigation system components.

Unit: I	Storage Works-Reservoirs	No. of Classes: 9

Storage Works-Reservoirs - Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve- Reservoir Sedimentation – Life of Reservoir. Types of dams, factors affecting selection of type of dam, factors governing selectionof site for a dam.

Unit: II	Gravity dams	No. of Classes: 9

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile, and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of Safety - Stability Analysis, Foundation for a Gravity Dam, drainage and inspection galleries.

Unit: III	Earth dams	No. of Classes: 9

Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage. Spillways: types of spillways, Design principles of Ogee spillways - Spillway gates. Energy Dissipaters and Stilling Basins Significance of Jump Height Curve and Tail Water Rating Curve - USBR and Indian types of Stilling Basins.

Unit: IV	Diversion Head works	No. of Classes: 9

Diversion Head works: Types of Diversion head works- weirs and barrages, layout of diversion head work - components. Causes and failure of Weirs and Barrages on permeable foundations, -Silt Ejectorsand Silt Excluders

Weirs on Permeable Foundations – Creep Theories - Bligh's, Lane's and Khosla's theories, Determination of uplift pressure- Various Correction Factors – Design principles of weirs on permeable foundations using Creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron.

Unit: V	Canal Falls	No.of Classes: 9

Canal Falls - types of falls and their location, Design principles of Notch Fall and Sarada type Fall. Canal regulation works, principles of design of cross and distributary head regulators, types of Canal escapes - types of canal modules, proportionality, sensitivity, setting and flexibility. Cross Drainage works: types, selection of suitable type, various types, design considerations for cross .

Text Books:

1. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg, Khanna Publishers.
2. Irrigation engineering by K. R. Arora Standard Publishers.
3. Irrigation and water power engineering by Punmia & Lal,Laxmi publications Pvt. Ltd., NewDelhi.

Reference Books:

1. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
2. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers 2015.
3. Irrigation Theory and Practice by A. M. Micheal Vikas Publishing House 2015.
4. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers.

Web References:

https://nptel.ac.in/courses/105/105/105105110/

E-Text Books:

https://www.academia.edu/39785798/_G_L_Asawa_Irrigation_and_Water_Resources_Engin_z_lib_org_?email_work_card=view-paper

CE722PE: PIPELINE ENGINEERING (PE – IV)

B.Tech. IV Year I Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CE722PE	PEC	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite: Fluid Mechanics, Hydraulics and Hydraulic machinery

Course Objectives: The objectives of the course are to:

- To familiarize the students with the various elements and stages involved in transportationof water.
- To understand standards and practices in piping design.
- To know various equipment and their operation in pipeline transportation.
- To understand technology in transportation of fluids.

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

- Get an understanding of the key steps in a pipeline's lifecycle: design, construction, installation,asset management and maintenance.

Unit: I	Elements of pipeline design, Pipeline route selection, survey and geotechnical guidelines	No. of Classes: 9

Elements of pipeline design: Types of piping systems; transmission lines, In-plant piping systems, Distribution mains, Service lines. Types of Water distribution networks; serial networks, branched networks and looped networks. Network components and Network model. Basic hydraulic principles; continuity and Energy principle.

Pipeline route selection, survey and geotechnical guidelines: Introduction - Preliminary route selection - Key factors for route selection - Engineering survey - Legal survey - Construction / As-builtsurvey - Geotechnical design.

Unit: II	Frictional Head loss in Pipes	No. of Classes: 9

Frictional Head loss in Pipes: Major and Minor losses, Artificially roughened pipes, moody Diagram. Friction coefficient relationships, Empirical formulae, Simple pipe flow problems Equivalent pipes; pipes in series, parallel, series-parallel; problems. Water Hammer and energy transmission through pipes: gradual and Instantaneous closure.

Unit: III	Reservoirs, Pumps and Valves, Network Parameters and Types of analysis	No. of Classes: 9

Reservoirs, Pumps and Valves: Types of Reservoirs, Pumps; introduction, system head-discharge- pump head and head-discharge relationships, characteristic curves, pump combination. Valves: check valves, flow control valves, Pressure Reducing valves, both Flow control and Pressure Reducing Valves.

Network Parameters and Types of analysis: Network parameters, Parameter interrelationships, Necessity of Analysis, common Assumptions, types of analysis, rules for Solvability of Pipe networks.

Unit: IV	Network Formulation of Equations	No. of Classes: 9

Network Formulation of Equations: States of parameters, Single-Source Networks with known pipe Resistances. Multisource Networks with known pipes resistances. Networks with unknown pipe resistances. Inclusion of Pumps, Check Valves, Flow Control Valves and Pressure Reducing Valves –Problems.

Hardy Cross Method: Methods of balancing heads (Loop Method). Method of Balancing Flows (Node Method). Modified Hardy Cross Method. Convergence Problem. Different software for WDN analysis and design.

Unit: V	Materials selection and quality management, Pipeline construction, protection, Instrumentation, pigging & Operations	No.of Classes: 9

Materials selection and quality management: Elements of design – Materials designation standards

– Quality management.

Pipeline construction: Construction – Commissioning.

Pipeline protection, Instrumentation, pigging & Operations: Pipeline coating – Cathodic protection

– Cathodic protection calculations for land pipelines – Internal corrosion – Flow meters and theircalibration – Sensors – Pigs-Pipeline Operations and maintenance.

Text Books:

1. Analysis of Water Distribution Networks, P.R. Bhave and R. Gupta, Narosa Publishing HousePvt. Ltd.
2. Pipeline Engineering, Henry Liu, Lewis Publishers (CRC Press), 2003.
3. Piping and Pipeline Engineering: Design, Construction, Maintenance Integrityand Repair, George A. Antaki, CRC Press, 2003.

Reference Books:

1. Piping Calculation Manual, E. Shashi Menon, McGraw-Hill, 2004.
2. Pipeline Rules of Thumb Handbook, E. W. McAllister, 7th Edition, 2009.
3. Liquid Pipeline Hydraulics, E. Shashi Menon, Mareel Dekker Inc., 2004.

Web References:

E-Text Books:

CE723PE: GROUND WATER HYDROLOGY (PE – IV)

B.Tech. IV Year I Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CE723PE	PCC	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite: Hydraulics & Fluid Mechanics

Course Objectives: The objectives of the course are to:

- **To explain** the concepts of Groundwater Development and Management.
- To **demonstrate and** derive the basic equations used in Groundwater development andmanagement and the corresponding equations

To know the investigations, field studies to conduct basic ground water studies.

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

- **Identify** different fundamental equations and concepts as applied in the Groundwater studies
- **Discuss** and derive differential equation governing groundwater flow in three dimensions
- To **solve** groundwater mathematical equations and analyze pumping tests in steady and non-steady flow cases
- **Distinguish** and understand the saline water intrusion problem in costal aquifers.

Unit I	**Ground Water Occurrence**	No. of Classes: 9

Ground Water Occurrence

Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, Vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as aquifers, types of aquifers, porosity, specific yield and specific retention. Ground Water Movement-Permeability, Darcy's law, storage coefficient, Transmissivity, Differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system, ground water flowcontours and their applications.

Unit II	**Analysis of Pumping Test Data-I**	No. of Classes: 9

Analysis of Pumping Test Data-I

Steady flow ground water flow towards a well in confined and unconfined aquifers-Dupit's and Theism's equations, assumptions, formation constants, yield of an open well interface and well tests.

Unit III	**Analysis of Pumping Test Data-II**	No. of Classes: 9

Analysis of Pumping Test Data-II

Unsteady flow towards well-Non-Equilibrium equations, Thesis solution, Jocob and Chow's simplifications, Leak aquifers.

Unit IV	**Surface and sub-surface Investigation**	No. of Classes: 9

Surface and sub-surface Investigation

surface methods of exploration-Electrical resistivity method and Seismic refraction methods. Subsurface methods geophysical logging and resistivity logging. Concept of artificial recharge of groundwater, recharge methods, Applications of GIS and RS in artificial recharge of ground water along with case studies.

Unit V	**Saline water intrusion in aquifer**	No.of Classes: 9

Saline water intrusion in aquifer

Occurrence of saline water intrusion, Ghyben-Herzberg relation, Shape of interface, control of water intrusion. Ground water basin management-case studies.

Text Books:

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Ground water by H.M. Raghunath, Wiley Eastern Ltd.
3. Groundwater System Planning & Management, R. Willes & W.W.G. Yeh, Prentice Hall.

Reference Books:

1. Ground water by Bawvwr, John Wiley & Sons.
2. Applied Hydrogeology by C.W. Fetta, CBS Publishers & Distributors.

Ground Water Assessment, Development and Management by K R Karanth, McGraw Hill Publications

Web References:

E-Text Books:

CS700OE: DATA STRUCTURES (Open Elective - II)

B.Tech. CSE/IT IV Year I Sem

L	T	P	C
3	0	0	3

Prerequisite:

1. A course on "Programming for Problem Solving "

Course Objectives:

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms

Course Outcomes:

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations orcombinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and generaltree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT - I

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

UNIT - II

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash table representation: hash functions, collision resolution-separate chaining, open addressing- linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT - III

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching,Red –Black, Splay Trees.

UNIT - IV

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sortings: Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V

Pattern matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXT BOOKS:

1. Fundamentals of data structures in C, 2 nd edition, E.Horowitz, S.Sahni and Susan AndersonFreed, Universities Press.
2. Data structures using c – A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearsoneducation.

REFERENCE BOOKS:

1. Data structures: A Pseudocode Approach with C, 2nd edition, R.F.Gilberg And B.A.Forouzan,Cengage Learning.
2. Introduction to data structures in c, 1/e Ashok Kamthane.

SM701MS: PROFESSIONAL PRACTICE, LAW AND ETHICS (PC)

B.Tech. IV Year I Semester

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Course Objectives:

- To make the students understand the types of roles they are expected to play in thesociety as practitioners of the civil engineering profession
- To develop some ideas of the legal and practical aspects of their profession.

Course Outcome: The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen

UNIT - I

Professional Practice and Ethics: Definition of Ethics, Professional Ethics - Engineering Ethics, Personal Ethics; Code of Ethics - Profession, Professionalism, Professional Responsibility, Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistle blowing, protected disclosures. Introduction to GST- Various Roles of Various Stake holders

UNIT - II

Law of Contract: Nature of Contract and Essential elements of valid contract, Offer and Acceptance, Consideration, Capacity to contract and Free Consent, Legality of Object. Unlawful and illegal agreements, Contingent Contracts, Performance and discharge of Contracts, Remedies for breach of contract. Contracts-II: Indemnity and guarantee, Contract of Agency, Sale of goods Act -1930: GeneralPrinciples, Conditions & Warranties, Performance of Contract of Sale.

UNIT - III

Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expertdetermination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal

– appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality,resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

UNIT - IV

Engagement of Labour and Labour & other construction-related Laws: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other - Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017.

UNIT - V

Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970

TEXT BOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ravinder Kaur, Legal Aspects of Business, 4e, Cengage Learning, 2016.

REFERENCE BOOKS:

1. RERA Act, 2017.
2. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
3. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House.
4. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers.