Bachelor of Technology (CIVIL Engineering), KUK

CreditBased (2018-19 Onwards)

*SCHEME OF STUDIES/EXAMINATIONS (***Semester VII***)*

S. No.	Course No./ Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of exam (Hours)
						Major Test	Minor Test	Practical	Total	
1	CE401A	Design of Concrete StructureII	2:0:0	2	2	75	25	0	100	3
2	ES212A	Energy Science & Engineering	2:0:0	2	2	75	25	0	100	3
3	CE405A	Water Resources Engineering	2:0:0	2	2	75	25	0	100	3
4	OEII	Open ElectiveII	2:0:0	2	2	75	25	0	100	3
5	ELIII	ElectiveIII	3:0:0	3	3	75	25	0	100	3
6	ELIV	ElectiveIV	3:0:0	3	3	75	25	0	100	3
7	CE411LA	Concrete Drawing	0:0:3	3	1.5		40	60	100	3
8	ES212LA	Energy Science & Engineering Lab	0:0:2	2	1		40	60	100	3
9	CE415LA	Minor Project	0:0:8	8	4		40	60	100	3
10	SIM903A	Seminar on Summer Internship	1:0:0	1	0		50		50	3
		Total	15:0:13	28	22.5	450	320	180	950	

Note: (1) SIM903A is a credit course in which the students will be evaluated for the Summer Internship (training) undergone after 6th semester.

(2)The students have to carry out the MINOR Project either from Transportation Engineering, Hydraulic Engineering and GeotechnicalEngineering.

OPEN ELECTIVE II

Sl. No	Code No.	Subject	Semester	Credits
1.	OE407A	Metro Systems and Engineering	VII	3
2.	OE409A	Indian Music System	VII	3
3.	OE417A	Introduction to Philosophical Thoughts	VII	3

ELECTIVEIII A

Sl. No	Code No.	Subject	Semester	Credits
1.	EL419A	Environmental Impact Assessment	VII	3
2.	EL421A	Air and Noise Pollution Control	VII	3
3.	EL423A	Foundation engineering	VII	3
4.	EL425A	Rock Mechanics	VII	3

ELECTIVEIV A

Sl. No	Code No.	Subject	Semester	Credits
1.	EL427A	Railway Engineering	VII	3
2.	EL429A	Airport Planning and Design	VII	3
3.	EL431A	River Engineering	VII	3
4.	EL433A	Pipeline Engineering	VII	3

L	T	P/D	Total	**Subject Code: CE-401A**	Max. Marks: 100
2	0	0	2		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		Students will acquire the knowledge about the design of concrete structures like Beam, Slabs, Stair case, Water Tanks and Building frames.			
UNIT		**Course Outcomes**			
I		Students will be able to study behavior in the Beam and Prestressed concrete – moments, shear and design of beam.			
II		Students will be able to design different types of Slabs, Stair case and Foundations.			
III		Students will be able to design of Water tanks, Silos and Bunkers.			
IV		Students will be able to analyze the frames structures			

UNIT I

Continuous Beams:

Basic assumptions, Moment of inertia, settlements, Modification of moments, maximum moments and shear, beams curved in plananalysis for torsion, redistribution of moments for single and multispan beams, design examples.

Prestressed Concrete:

Basic principles, classification of prestressed members, various Prestressing systems, losses in prestress, initial and final stress conditions, analysis and design of sections for flexure and shear, load balancing concept, I:S:Specifications. End blocksAnalysis of stresses, Magnel's method, Guyon's method, Bursting and spelling stresses, design examples.

UNIT II

Flat slabs and staircases:

Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, openings in flat slab, design of various types of staircases, design examples.

Foundations:

Combined footings, raft foundation, design of pile cap and piles, underreamed piles, design examples.

UNIT III

Water Tanks, Silos and Bunkers:

Estimation of Wind and earthquake forces, design requirements, rectangular and cylindrical underground and overhead tanks, Intze tanks, design considerations, design examples. Silos and BunkersVarious theories, Bunkers with sloping bottoms and with high side walls, battery of bunkers, design examples.

UNIT IV

Building Frames:

Introduction, Member stiffness’s, Loads, Analysis for vertical and lateral loads, Torsion in buildings, Ductility of beams, design and detailing for ductility, design examples.

Yield Line Theory:

Basic assumptions, Methods of analysis, yield line patterns and failure mechanisms, analysis of one way and two way rectangular and nonrectangular slabs, effect of top corner steel in square slabs, design exampl

Books:

1. Plain and Reinforced Concrete, Vol.2, Jai Krishna &O.P.Jain, Nem Chand & Bros.,Roorkee.

2. PreStressed Concrete, Krishna Raju, TMH Pub,New, Delhi.
3. Design of Prestressed Concrete Structures, T.Y.Lin, John Wiley &Sons, New .Delhi.
4. Reinforced ConcreteLimit Stage Design, A.K.Jain, Nem Chand & Bros., Roorkee.
5. IS 13431980,IS Code of Practice for Prestressed Concrete.
6. IS 33701976(Part I to IV), Indian Standard Code of Practice for Liquid Retaining Structures.
7. IS 4562000, Indian Standard of Practice for Plain and Reinforced Concrete, IS 1893, 4326 & 13920 Indian Standard Code of Practice for Earthquake Resistant Design of Structures.

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Energy Science & Engineering					
L	T	P/D	Total	**Subject Code: ES-212A**	Max. Marks: 100

2	0	0	2		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		The knowledge acquired lays a goodfoundation for design of various civil engineering systems/ projects dealing with these energy generation paradigms in an efficient manner.			
UNIT		**Course Outcomes**			
I		To provide an introduction to energy systems and renewable energy resources			
II		It will explore fossil fuels and nuclear energy, and then focus on alternatives, renewable energy sources such as solar, biomass (conversions), wind power, waves and tidal, geothermal, ocean thermal, hydro and nuclear.			
III		It will explore society's present needs and future energy demands, examine conventional energy sources.			
IV		Energy conservation methods will be emphasized from Civil Engineering perspective.			

UNIT I

Introduction to Energy Science: Introduction to Energy, sustainability & the environment, Energy systems and resources Scientific principles and historical interpretation of energy use in critical societal, environmental and climate issues.

UNIT II

Energy Sources: Fossil fuels (coal, oil, oilbearing shale and sands, coal gasification) past, present & future, Remedies & alternatives for fossil fuels biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental tradeoffs of different energy systems; possibilities for energy storage or regeneration.

UNIT III

Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; economics of energy.

UNIT IV

Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration off shore platforms, Underground and undersea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations aboveground and underground along with associated dams, tunnels, penstocks, etc.

Books:

1. Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford University Press
2. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press
3. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living, Gaiam
4. JeanPhilippe; Zaccour, Georges (Eds.), (2005), Energy and Environment Set: Mathematics of
Decision Making, Loulou, Richard; Waaub, XVIII,
5. Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A. (2006) Energy

and the Environment, 2nd Edition, John Wiley
6. UNDP (2000), Energy and the Challenge of Sustainability, World Energy assessment
7. E H Thorndike (1976), Energy & Environment: A Primer for Scientists and Engineers, AddisonWesley Publishing Company

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Water Resource Engineering					
L	T	P/D	Total	**Subject Code: CE-405A**	Max. Marks: 100
2	0	0	2		Theory: 75 marks
					Sessional: 25 Marks

					Duration: 3 hrs.
Course Objective	Understand application of systems concept, advanced optimization techniques to cover the sociotechnical aspects in the field of water resources				
UNIT	**Course Outcomes**				
I	Students will able to study the concept of water resource planning				
II	Students will of understand basics of economics				
III	Students will study about water resource systems				
IV	Students Will study about application of system approaches for water resources				

UNIT I

Water Resources Planning:

Role of water in national development, assessment of water resources, planning process, environmental consideration in planning, system analysis in water planning, somecommon problems in project planning, functional requirements in multipurpose projects,multipurpose planning, basin wise planning, long term planning.Reservoir planningdependable yield, sedimentation in reservoir, reservoir capacity,empiricalarea reduction method.

UNIT II

Economic and Financial Analysis:

Meaning and nature of economic theory, micro and macroeconomics, the concept ofequilibrium, equivalence of kind, equivalence of time and value, cost benefit, discountingfactors and techniques, conditions for project optimality, cost benefit analysis, cost allocation, separable and nonseparable cost, alternate justifiable and remaining benefitmethods, profitability analysis.

UNIT III

Water Resources Systems Engineering:

Concept of system's engineering, optimal policy analysis, simulation and simulationmodeling, nature of water resources system, analog simulation, limitations of simulation,objective function, production function, optimality condition, linear, nonlinear anddynamic programming, applications to real time operations of existing system,hydrologic modeling and applications of basic concepts.

UNIT IV

Applications of System Approach in Water Resources:

Applications of system engineering in practical problems like hydrology, irrigation anddrainage engineering, distribution network, and mathematical models for forecasting andother water resources related problems.

Books:

1 Water Resources Engineering by Linseley and Franzini

2 Economics of Water Resources Engineering by James and Lee.

3 Optimisation Theory and Applications by S.S.Roy

4 Water Resources Systems Planning & Economics by R.S.Varshney.

5 Operational ResearchAn Introduction by HamdyA.Taha.

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Metro Systems and Engineering					
L	T	P/D	Total	**Subject Code: OE-407A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks

					Duration: 3 hrs.
Course Objective	To impart the knowledge about basic engineering principles of Metro System.				
UNIT	**Course Outcomes**				
I	Students will be able to know about the metro systems.				
II	Students will be able to learn about different metro structures and their construction methods.				
III	Students will be able to learn about electronic signaling systems and Automatic fare collection.				
IV	Students will be able to understand different facilities in metro.				

Unit – I

General: Overview of Metro Systems; Need for Metros; routing studies; Basic Planning and Financials.

Unit –II

Civil Engineering Overview and construction methods for: Elevated and underground Stations; Viaduct spans and bridges; Underground tunnels; Depots; Commercial and Service buildings. Initial Surveys & Investigations; Basics of Construction Planning & Management, Construction Quality & Safety Systems. Traffic integration, multimodal transfers and pedestrian facilities; Environmental and social safeguards; Track systemspermanent way. Facilities Management

UnitIII

Electronics And Communication Engineering Signaling systems; Automatic fare collection; Operation Control Centre (OCC and BCC); SCADA and other control systems; Platform Screen Doors.

UnitIV

Mechanical &TVS, AC: Rolling stock, vehicle dynamics and structure; Tunnel Ventilation systems; Air conditioning for stations and buildings; Fire control systems; Lifts and Escalators. ELECTRICAL: OHE, Traction Power; Substations TSS and ASS; Power SCADA; Standby and Backup systems.

Textbook:

1. Guidebook on Delhi Metro, DMRC
2. World Metro System, Paul. E. Garbutt.
3. Metro Rail in India for Urban Mobility, M.M Agarwal, S.Chandra, K.K Miglani

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Indian music system					
L	T	P/D	Total	**Subject Code: CE-409A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.

Course Objective	To learn basic concept of Indian Music.
UNIT	**Course Outcomes**
I	Students will be able to learn about ragas
II	Students will be able to understand to learn about different notation of sound.
III	Students will able to learn notation compositions.
IV	Students will learn theory of ragas.

UNIT I

Raga, Va(Nada, Swara, Shruti, Raga, Mela (Thata), Alankar, Tana, Gamak, Sthaya, Kaku, MargiDeshi, RagalapRupkalap, Vadi, Samvadi, Anuvadi, Vivadi, Tala, Laya, Avirbhav, Tirobhav, Parmelpraveshak Raga, Sandhiprakash ggeyakara, Kalawant.

UNIT II

Vibration, Pitch, Intensity, Timbre, Just intonation, Equal tempered scale, forced Vibration, Free Vibration.

UNIT III

Notation of compositions in prescribed ragas.

UNIT IV

Theoretical knowledge of prescribed ragas.

Books

1. S.S. Paranjape Bhartiya Sangeet Ka Itihasa
2. S.S. Paranjape Sangeet Bodh
3. V.N. Bhatkhande Bhatkhande Sangeet Shastra PartIII
4. Swami Prajnananda History of Indian Music

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Introduction to Philosophical Thoughts					
L	T	P/D	Total	**Subject Code**: **OE-417A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks

					Duration: 3 hrs.
Course Objective	Students will acquire the knowledge about the Philosophical concepts				
UNIT	**Course Outcomes**				
I	Students will be able to understand concept of philosophy				
II	Students will be able to understand concept of ethics				
III	Students will be able to understand concept of philosophy of religion				
IV	Students will be able to understand concept of aesthetics				

UNIT I

Introduction to Class: Introduction to Philosophy and its worldview. 7 fold criteria for analysis, Presocratic Philosophy, Metaphysics & Epistemology: Ancient (Plato; Aristotle), Medieval (Plotinus; St. Augustine; St. Aquinas), Metaphysics & Epistemology continued: Stoicism, Epicureanism, Skepticism, & NeoPlatonism Berkeley; Leibniz; Spinoza; Locke; Hume; Kant; Introduction to Continental Philosophy

UNIT II

Introduction to Ethics: Virtue, Deontological, & Consequential Ethics: Consequential Ethics; Utilitarianism (Jeremy Bentham; John Stuart Mill); Egoism of Ayn Rand; Relativism; Ethics of Care vs. Ethics of Justice (Carol Gilligan) Existentialism/ Nihilism

UNIT III

Introduction to Philosophy of Religion: Existence of God: Arguments; Evidences; Existential; Religious Experience, Problem of Evil: Moral Evil: Natural Evil: God as Origin of Evil; Natural Evil; Pointless Evil, Problem of Miracles:

UNIT IV

Introduction to Aesthetics: Historical Survey: From Plato to Kuspit Read and discuss"Aesthetic Universals" by Denis Dutton Aesthetics continued: Objective/subjective beauty; aesthetic value; aesthetic experience

Books:

The Power of Idea, Book by Isaiah Berlin

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Environmental Impact Assessment					
L	T	P/D	Total	**Subject Code: EL-419A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective	The aim of study is to understand the effect of Environment , Air and Water pollution on environment				

UNIT	Course Outcomes
I	Students will study the different sources of Environment pollution
II	Students will study the different sources of Air pollution and its effects
III	Students will study about the Waste management and its disposal of waste
IV	Students will study about Environmental assessment

UNIT I

Environment and Human Activity: Resources, pollution, reuse and environmental management. Management of Aquatic Environment: Water quality controls. Drainage basin activities and water pollution. The impact of human activity on aquatic resources. The control measures, regional planning.

UNIT II

Air Quality Management: Atmosphere, effect of human activity on air quality, waste disposal alternative. Optimization, planning of waste disposal.

UNIT III

Waste Management: Waste disposal methods, impact of waste disposal of human activity. Land Use Management: Impact of land use on human life. Control, of hazards in land use, management of land use.

UNIT IV

Environmental Assessment: National environmental policy, implication of environment assessment in design process. Preparation of assessment, quantification. General requirements of environmental standards. Techniques of setting standards.

Books:

1. Environmental Impact Analysis by R.K. Jail and L.V. Urban.
2. Environmental Impact Assessment by Canter
3. Environmental Impact Assessment by J.Glasson.

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Air and Noise Pollution Control					
L	T	P/D	Total	**Subject Code EL-421A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.

Course Objective	To impart the knowledge about basic engineering principles of River Engineering
UNIT	**Course Outcomes**
I	To take up the basic concepts of air pollution
II	The contents involved the knowledge of causes of air pollution
III	The contents involved the knowledge of health related to air pollution and to develop skills relevant to control of air pollution.
IV	To take up the basic concepts of Noise pollution

Unit I

Introduction: History of Air pollution and episodes, Sources of air pollution and types, Introduction to meteorology and transport of air pollution: Global winds, Headley cells, wind rose terrestrial wind profile, Effects of terrain and topography on winds, lapse rate, maximum mixing depths, plume rise

Unit II

Effects of Air Pollution: Effects of Air Pollution on human beings, plants and animals and Properties. Global EffectsGreen house effect, Ozone depletion, heat island, dust storms, Automobile pollution sources and control, Photochemical smog, Future engines and fuels

Unit III

Air Pollution control: Air Pollution control at sourceequipments for control of air pollutionFor particulate matterSettling chambersFabric filtersScrubbersCyclones, Electrostatic precipitators, For Gaseous pollutantscontrol by absorptionadsorption scrubberssecondary combustion after burners, Working principles advantages and disadvantages, design criteria and examples.

Air Quality Sampling and Monitoring: Stack sampling, instrumentation and methods of analysis of SO2, CO etc, legislation for control of air pollution and automobile pollution.

Unit IV

Noise pollution: Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria, effects of noise on health, annoyance rating schemes; special noise environments: Infrasound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices. Noise control methods.

Books:

1. C. S. Rao, “Environmental Pollution Control Engineering”, Wiley Eastern Limited, 2000.
2. M. N. Rao, H. V. N. Rao, Air pollution, Tata McGraw Hill Pvt Ltd, New Delhi, 1993
3. Dr. Y. Anjaneyulu, “Air Pollution and Control Technologies”, Allied publishers Pvt. Ltd., 2002.
4. Advanced Air and Noise Pollution Control by Lawrence K. Wang, Norman C. Pereira & Yung Ise Hung.
5. Noise Pollution and Control by S. P.Singhal, Narosa Pub House

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Foundation Engineering					
L	T	P/D	Total	**Subject Code: EL-423A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		To impart the knowledge on various soil exploration techniques, and analyses and design of various substructure			
UNIT		**Course Outcomes**			
I		Students will be able to study different types of soil exploration			

II	Students will be able to study slope stability
III	Students will be able to understand Earth pressure theories
IV	Students will be able to understand shallow foundation and pile foundation

UNIT I

Soil Exploration: Need – methods of soil exploration – boring and sampling methods – penetration tests – plate load test – pressure meter – planning of soil exploration programand preparation of soil investigation report.

UNIT II

Slope Stability: Infinite and finite earth slopes – types of failures – factor of safety of infiniteSlopes – stability analysis by Swedish slip circle method, method of slices, Bishop's Simplified method of slices – Taylor's Stability Number stability of slopes of earth dams under different conditions.

UNIT III

Earth Pressure Theories: Atrest earth pressures, Rankin's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Cullman's graphical method, effect of pore water, earth pressure due to surcharge loads.

Retaining Walls: Types of retaining walls – stability of gravity and cantilever retaining walls against overturning, sliding and, bearing capacity modes of failure, Drainage from backfill, introduction to reinforced earth walls.

UNIT IV

Shallow Foundations Types choice of foundation, location and depth safe bearing capacity, shear criteria, Terzaghi's, and IS code methods settlement criteria, allowable bearing pressure based on SPT N value and plate load test, allowable settlements of structures.

Pile Foundation: Types of piles, load carrying capacity of piles based on static pileformulae, dynamic pile formulae – Pile Capacity through SPT and CPT results pile loadtests load carrying capacity of pile groups in sands and clays, Settlement of pile groups, negative skin friction

TEXT BOOKS:

1. Das, B.M., (2011) Principles of Foundation Engineering –7th edition, CengagePublishing.
2. Foundation Design Principles and Practices, Donald P. Coduto, 2nd Edition, PearsonPublishers.
3. Bowles, J.E., (2012) Foundation Analysis, and Design – 5th Edition, McGrawHill Publishing Company, Newyork.

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Rock Mechanics					
L	T	P/D	Total	**Subject Code: EL-425A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		To impart the knowledge about rock mechanism.			
UNIT		**Course Outcomes**			
I		Students will be able to understand basic concepts of rock engineering			

II	Students will be able to learn about different methods of rock exploration
III	Students will be able to learn different tests performed on rocks.
IV	Students will be able to learn about Pressure arch theory, subsidence and suitable protective measures

Unit I

Definition & its importance: Rock mass & material form; Effects of discontinuities on rock mass. Physical properties of rocks, Mechanical properties of rocks. Engineering Classification of rock Masses (by deer & miller). Moh's scale of Hardness Rock Pressure & Subsidence.

Unit II

Object and Methods of rock exploration, Rock exploration by direct penetration Core boring Core recovery Rock quality designation Fracture frequency by indirect penetration Large diameter calyx hole Logging of core

Unit III

Sampling and Sample preparation, Specimen Uniaxial compressive strength Test; Protodykanov strength index. Tests for measuring rock strengths Tensile strength tests, Flexural strength test, Shear strength test, Punch shear test and In situ tests.

Unit IV

Pressure arch theory Rectangular opening, circular shaft & long wall working. Creep, Convergence, Rock burst & Coal bumps, Rock Mass Rating. Subsidence: Definition & factors governing subsidence. Angle of draw, line of break; Critical area, Subcritical area, super critical area. Protective measures against Subsidence.

Books:

1. Fundamentals of Rock Mechanics" by J C Jaeger and N G W Cook
2. Rock Mechanics and Design Structures of Rock" by Obert and W I Duvall

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Railway Engineering					
L	T	P/D	Total	**Subject Code: EL-427A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		Students will acquire the knowledge about the design of Railways			
UNIT		**Course Outcomes**			
I		Students will be able to study about permanent way and different types of rails			
II		Students will be able to study different types of Sleepers, fastenings and Ballast			
III		Students will be able to learn about Points and crossings, signalling and interlocking			

	system
IV	Students will be able to learn geometric design of Rails and stations

UNIT I

Introduction, Permanent Way and Rails

Rail transportation and its importance in India. Permanent way: requirements and components. Gauges in India and abroad. Selection of gauge. Coning of wheels. Adzing of sleepers. Rails: functions, composition of rail steel, types of rail sections, requirements of an ideal rail section, length of rails. Defects in rails. Creep of rails. Long welded rails and continuously welded rails.

UNIT II

Sleepers, Fastenings and Ballast

Sleepers: functions, requirements of an ideal sleeper. Types of sleepers: wooden, cast iron, steel and concrete sleepers, advantages, disadvantages and suitability of each type. Sleeper density. Fastenings for various types of sleepers: fish plates, spikes, bolts, bearing plates, keys, chairs, jaws, tie bars. Elastic fastenings. Ballast: functions, requirements, types of ballast and their suitability.

UNIT III

Points and Crossings

Necessity. Turnout: various components, working principle. Switch: components, types. Crossing: components and types. Design elements of a turnout, design of a simple turnout. Layout plan of track junctions: crossovers, diamond crossing, singledouble slips, throw switch, turn table, triangle.

Signalling, Interlocking and Train Control

Signals: objects, types and classification. Semaphore signal: components, working principle. Requirements / principles of a good interlocking system. Brief introduction to devices used in interlocking. Methods of control of train movements: absolute block system, automatic block system, centralized train control and automatic train control systems.

UNIT IV

Geometric Design of the Track

Gradients, grade compensation. Super elevation, cant deficiency, negative super elevation. Maximum permissible speed on curves .Tractive resistances, types. Hauling capacity of a locomotive.

Stations, Yards and Track Maintenance

Stations: functions and classification. Junction, nonjunction and terminal stations. Yards: functions, types. Marshalling yard: functions, types. Maintenance of railway track: necessity, types of maintenance. Brief introduction to mechanized maintenance, M.S.P and D.T.M.

Books:

1. A text book of Railway Engineering by S.C.Saxena and S.P.Arora, Dhanpat Rai Publicatios, N.Delhi
2. Railway Track Engg. ByJ.S.Mundray, Tata McGrawHill Publishing Co. Ltd. N.Delhi.

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Airport Planning and Design					
L	T	P/D	Total	**Subject Code**: **EL-429A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		Students will acquire the knowledge about airport planning and design.			
UNIT		**Course Outcomes**			
I		Students will be able to understand layout of airport plan			
II		Students will be able to design runway			
III		Students will be able to understand Structural design of airport pavement			

IV	Students will be able to understand basics of visual aids and to understand basics of airport grading and drainage

UNIT I

Airport Planning: General Regional Planning Development of New Airport Data Required before Site Selection Airport Site Selection Surveys for Site Selection Drawings to be prepared Estimation of Future Air Traffic Needs.

UNIT II

Runway Design: Runway Orientation Basic Runway Length Corrections for Elevation, Temperature and Gradient Airport Classification Runway Geometric Design Airport Capacity Runway Configurations Runway Intersection Design.

UNIT III

Structural Design of Airport Pavements: Introduction Various Design Factors Design Methods for Flexible Pavement Design Methods for Rigid Pavement LCN System of Pavement Design Joints in Cement Concrete Pavement Airport Pavement Overlays Design of an Overlay.

UNIT IV

Visual Aids: General Airport Marking Airport Lighting.

Airport Grading And Drainage: General Computation of Earthwork Airport Drainage Special Characteristics and Requirements of Airport Drainage Design Data Surface Drainage Design Subsurface Drainage Design.

Books:

1. Airport Planning and Designing by S.K. Khanna, M.G. Arora.
2. Highway Engineering including Expressways and Airport Engineering by Dr. L. R. Kadyali, Dr. N. B. Lal.
3. Highway Engineering including Airport Pavements by Dr. S. K. Sharma.
4. Transportation Engineering by S. P. Chandola.

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: River Engineering					
L	T	P/D	Total	**Subject Code: EL-431A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		To impart the knowledge about basic engineering principles of River Engineering			
UNIT		**Course Outcomes**			
I		Students will be able to study different rivers and related budgets and schemes			
II		Students will be able to study behavior of rivers			
III		Students will be able to understand mechanics of alluvial river and bio engineering techniques			

IV	Students will be able to understand various river training works

Unit I

Introduction, classification of Rivers, Mechanics of alluvial rivers including channel and flood plain features, Sediment transport and budgets, River morphology and various classification schemes.

Unit II

Behavior of Rivers: Introduction, River Channel patterns, Straight river channels, causes, characteristics and shapes of meanders and control, cutoff, Braided Rivers, Bed forms, Instability of rivers, Hydraulic geometry, Delta formation and control.

Unit III

Mechanics of Alluvial Rivers, Rivers and restoration structures, Sociocultural influences and ethics of stream restoration.

Bioengineering Techniques, Classification review, Natural Channel Design Analysis, Time Series, and Analysis of flow, Sediment and channel geometry data.

Unit IV

River Training and Protection Works: Introduction, Classification of River Training, Types of training works, Protection for Bridges with reduced waterway, Design of Guide Band, embankment and spurs/dampers and other river/ flood protection works.

Books:

1. River Behaviour Management and Training (Vol. I & II), CBI&P, New Delhi.
2. Irrigation & Water Power Engineering, B. C. Punmia and Pande B. B. Lal.
3. River Engineering by Margeret Peterson

B. Tech. VII Semester (Civil Engineering)					
SUBJECT: Pipeline Engineering					
L	T	P/D	Total	**Subject Code: EL-433A**	Max. Marks: 100
3	0	0	3		Theory: 75 marks
					Sessional: 25 Marks
					Duration: 3 hrs.
Course Objective		To impart the knowledge about basic engineering principles of Pipeline Engineering			
UNIT		**Course Outcomes**			
I		To familiarize the students with the various elements and stages involved in transportation of oil and gas.			
II		To understand international standards and practices in piping design.			

III	To know various equipment and their operation in pipeline transportation.
IV	To understand modern trends in transportation of oil and gas

UNIT I

Elements of pipeline design: Fluid properties, Environment, Effects of pressure and temperature, Supply / Demand scenario, Route selection, Codes and standards Environmental and hydrological considerations,

UNIT II

Economics – Materials / Construction, Operation, Pipeline protection, Pipeline integrity monitoring. Pipeline route selection, survey and geotechnical guidelines: Introduction – Preliminary route selection. Key factors for route selection -Engineering survey – Legal survey – Construction / Asbuilt survey – Geotechnical design.

UNIT III

Natural gas transmission: General flow equation, Steady state, Impact of gas molecular weight and compressibility factor on flow capacity, Flow regimes, Widely used steadystate flow equations. Summary of the impact of different gas and pipeline parameters on the gas flow efficiency

Pressure drop calculation for pipeline in series and parallel, Pipeline gas velocity, Erosional velocity – Optimum pressure drop for design purposes – Pipeline packing – Determining gas leakage using pressure drop method – Wall thickness / pipe grade, Temperature profile, Optimization process – Gas transmission solved problems.

UNIT IV

Gas compression and coolers: Types of compressors, Compressor drivers, Compressor station configuration. Thermodynamics of isothermal and adiabatic gas compression, Temperature change in adiabatic gas compression, Thermodynamics of polytropic gas compression, Gas compressors in series. Centrifugal compressor horsepower, Enthalpy / Entropy charts (Mollier diagram) – Centrifugal compressor performance curve . Influence of pipeline resistance on centrifugal compressor

Textbooks

1. MSc Pipeline Engineering, Newcastle University
2. MSc Subsea Engineering & Management, Newcastle University
3. MSc Offshore & Ocean Technology, Cranfield University

4. MSc Pipeline Asset Management, North Umbria University (This is a Distance Learning course available online worldwide

B. Tech. VII Semester (Civil)
CE-411LA CONCRETE DRAWING

L T P/D: 0 0 3
Total Marks: 100 **Sessional: 40 marks**
Vivavoce: 60 marks **Duration: 3 hrs.**

Preparing drawing sheets showing reinforcement details in case of:

1. Flat slabs
2. Underground and Overhead Water Tanks.
3. Combined Footings, Pile Foundations and Raft foundation.
4. T-Beam Bridge.
5. Silo/Bunker.

B. Tech. (Civil) VII Semester
ES – 212LA Energy Science & Engineering Lab

L T P/D 0 0 2
Total Marks: 100 **Sessional: 40 marks**
Vivavoce: 60 marks **Duration: 3 hrs.**

LIST OF EXPERIMENTS

1 Determination of Flash point and Fire point of lubricating oil using Abel Pensky and Pensky Martin (closed) Apparatus.

2 Determination of Calorific values of solid, liquid and gaseous fuels

3 Determination of Viscosity of lubricating oil using Redwood and Saybolt Viscometers

4 Valve Timing diagram of an I.C. Engine.

5 To determine the flash and fire point of the lubricating oil by Pensky martens apparatus

6 To determine the kinematic and absolute viscosities of the given oil using red wood viscometer.

7 To determine the viscosity of given oil using torsion viscometer