J. S. University, Shikohabad

B. Tech

7th Semester& 8thSemester

(Civil Engineering)

Scheme

&

Syllabus

[Effective from the session 2024-25]

STUDY AND EVALUATION SCHEME FOR

B.TECH. (CIVIL ENGINEERING)

SEMESTER -VII

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	Cr.	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTHU-(701-702)	HSMC-1/HSMC-2	3	0	0	3	50	100	150	3
2	BTCE-(070-074)	Departmental Elective-IV	3	0	0	3	50	100	150	3
3	BTCE-(075-079)	Departmental Elective-V	3	0	0	3	50	100	150	3
4	BTOE-(071-079)	Open Elective-II	3	0	0	3	50	100	150	3
PRACTICAL / PROJECT SUBJECTS										
5	BTCE-751P	CONCRETE LAB	0	0	2	1	25	25	50	3
6	BTCE-752P	Mini Project or Internship Assessment*	0	0	2	1	50		50	3
7	BTCE-753P	Project	0	0	8	4	150		150	3
						18	Grand Total		**850**	

***The Mini Project or Summer Internship (4weeks) / NPTEL Course (4-week) conducted during summer break after VI semester and same will be assessed / evaluated in the Semester-VII.

HUMANITIES, SCOCIAL SCIENCE AND MANAGEMENT COURSE (HSMC COURSE) HSMC1/HSMC2

BTHU-701	RURAL DEVELOPMENT: ADMINISTRATION AND PLANNING (**HSMC1**)
BTHU-702	PROJECT MANAGEMENT & ENTREPRENEURSHIP (**HSMC2**)

LIST OF DEPARTMENTAL ELECTIVE-IV FOR B. TECH. COURSES

BTCE-070	RAILWAY, WATERWAY AND AIRWAY ENGINEERING
BTCE-071	SUSTAINABLE CONSTRUCTION METHODS
BTCE-072	PROBABILITY METHODS IN CIVIL ENGINEERING
BTCE-073	ADVANCE CONCRTET DESIGN
BTCE-074	SOLID WASTE MANAGEMENT

LIST OF DEPARTMENTAL ELECTIVE-V FOR B. TECH. COURSES

BTCE-075	DESIGN OF STEEL STRUCTURE
BTCE-076	URBAN TRANSPORTATION PLANNING
BTCE-077	GEO-SYNTHETICS AND REINFORCED SOIL STRUCTURE
BTCE-078	IRRIGATION AND WATER RESOURCE ENGINEERING
BTCE-079	DISASTER PREPAREDNESS AND MANAGEMENT

LIST OF OPEN ELECTIVES-II FOR B. TECH. COURSES

BTOE-071	FILTER DESIGN
BTOE-072	BIOECONOMICS
BTOE-073	MACHINE LEARNING
BTOE-074	RENEWABLE ENERGY RESOURCES
BTOE-075	OPERATIONS RESEARCH
BTOE-076	VISION FOR HUMANE SOCIETY
BTOE-077	DESIGN THINKING
BTOE-078	SOIL AND WATER CONSERVATION ENGINEERING
BTOE-079	INTRODUCTION TO WOMEN'S AND GENDER STUDIES

STUDY AND EVALUATION SCHEME FOR

B.TECH.(CIVIL ENGINEERING)

SEMESTER -VIII

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	Cr.	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTHU-801	HSMC-1/ HSMC-2	3	0	0	3	50	100	150	3
2	BTOE-(081-090)	Open Elective-III	3	0	0	3	50	100	150	3
3	BTOE-(091-097)	Open Elective-IV	3	0	0	3	50	100	150	3
PRACTICAL / PROJECT SUBJECTS										
4	BTCE-851P	Project	0	0	18	9	100	300	400	3
						18	Grand Total		**850**	

HUMANITIES, SCOCIAL SCIENCE AND MANAGEMENT COURSE (HSMC COURSE) HSMC1/HSMC2

BTHU-801	RURAL DEVELOPMENT: ADMINISTRATION AND PLANNING (**HSMC1**)
BTHU-802	PROJECT MANAGEMENT & ENTREPRENEURSHIP (**HSMC2**)

LIST OF OPEN ELECTIVES-III FOR B. TECH. COURSES

BTOE-081	FUNDAMENTALS OF DRONE TECHNOLOGY
BTOE-082	CLOUD COMPUTING
BTOE-083	BIO MEDICAL SIGNAL PROCESSING
BTOE-084	ENTREPRENEURSHIP DEVELOPMENT
BTOE-085	INTRODUCTION TO SMART GRID
BTOE-086	QUALITY MANAGEMENT
BTOE-087	INDUSTRIAL OPTIMIZATION TECHNIQUES
BTOE-088	VIROLOGY
BTOE-089	NATURAL LANGUAGE PROCESSING
BTOE-090	**HUMAN VALUES IN MADHYASTH DARSHAN

** It is mandatory that for these subjects only Trained Faculty (who had done the FDP for these courses) will teach the courses.

LIST OF OPEN ELECTIVES-IV FOR B. TECH. COURSES

BTOE-091	ELECTRIC VEHICLES
BTOE-092	AUTOMATION AND ROBOTICS
BTOE-093	COMPUTERIZED PROCESS CONTROL
BTOE-094	DATA WAREHOUSING & DATA MINING
BTOE-095	DIGITAL AND SOCIAL MEDIA MARKETING
BTOE-096	MODELING OF FIELD-EFFECT NANO DEVICES
BTOE-097	MODELLING AND SIMULATION OF DYNAMIC SYSTEMS

** It is mandatory that for these subjects only Trained Faculty (who had done the FDP for these courses) will teach the courses.

B.TECH 4 YEAR (VII Sem)

Semester – VII

BTHU-701-HSMC-I(RURAL DEVELOPMENT: ADMINISTRATION AND PLANNING)

Subject Code: BTME-701	**RURAL DEVELOPMENT: ADMINISTRATION AND PLANNING**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	understand the definitions, concepts and components of Rural Development		
CO2	know the importance, structure, significance, resources of Indian rural economy.		
CO3	Students will have a clear idea about the area development programmes and its impact.		
CO4	acquire knowledge about rural entrepreneurship.		
CO5	understand about the using of different methods for human resource planning		

CO-PO Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus

UNIT – I

Rural Planning & Development:

Concepts of Rural Development, Basic elements of rural Development, and Importance of Rural Development for creation of Sustainable Livelihoods, An overview of Policies and Programmes for Rural Development- Programmes in the agricultural sector, Programmes in the Social Security, Programmes in area of Social Sector.

UNIT-II

Rural Development Programmes:

Sriniketan experiment, Gurgaon experiment, marthandam experiment, Baroda experiment, Firkha development scheme, Etawa pilot project, Nilokheri experiment, approaches to rural

community development: Tagore, Gandhi.

UNIT-III

Panchayati Raj & Rural Administration:

Administrative Structure: 8 bureaucracy, structure of administration; Panchayati Raj Institutions Emergence and Growth of Panchayati Raj Institutions in India; People and Panchayati Raj; Financial Organizations in Panchayati Raj Institutions, Structure of rural finance, Government & Non-Government Organizations / Community Based Organizations, Concept of Self-help group.

UNIT-IV

Human Resource Development in Rural Sector:

Need for Human Resource Development, Elements of Human Resource Development in Rural Sector Dimensions of HRD for rural development-Health, Education, Energy, Skill Development, Training, Nutritional Status access to basic amenities – Population composition.

UNIT-V

Rural Industrialization and Entrepreneurship:

Concept of Rural Industrialization, Gandhi an approach to Rural Industrialization, Appropriate Technology for Rural Industries, Entrepreneurship and Rural Industrialization-Problems and diagnosis of Rural Entrepreneurship in India, with special reference to Women Entrepreneurship; Development of Small Entrepreneurs in India, need for and scope of entrepreneurship in Rural area.

Text Book & Reference Book

1. Corporate Social Responsibility: An Ethical Approach - Mark S. Schwartz
2. Katar Singh: Rural Development in India – Theory History and Policy
3. TodaroM.P. Economic Development in III World war
4. Arora R.C – Integrated Rural Development in India
5. Dhandekar V.M and Rath N poverty in India
6. A.N.Agarwal and KundanaLal: Rural Economy of India
7. B.K.Prasad: Rural Development-Sarup& Son's Publications

BTCE-070-RAILWAY, WATERWAY AND AIRWAY ENGINEERING

Subject Code: BTCE-070	RAILWAY, WATERWAY AND AIRWAY ENGINEERING	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Students should be able to Understand the history and development, role of railways, railway planning and development based on essential criteria's		
CO2	Students should be able to explain Track Geometrics, Turnouts and Crossings of railway Stations		
CO3	Students should be able to explain Signal and Interlocking of Urban Railways		
CO4	Students should be able to Design and plan airport layout, design facilities required for runway, taxiway and impart knowledge about visual aids.		
CO5	Students should be able to Design and planning of harbour and other costal structures.		

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	1	1	1	1	2	1	1	1
CO2	2	2	3	2	1	2	1	1	1	1	1	1
CO3	2	3	2	3	1	1	1	1	1	1	1	2
CO4	2	2	3	2	1	1	1	1	2	1	1	2
CO5	2	3	2	2	1	1	1	1	1	1	1	1
Course Average	2.20	2.40	2.60	2.20	1.00	1.20	1.00	1.00	1.40	1.00	1.00	1.40

Syllabus

UNIT-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.

UNIT-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

UNIT–III

Signalling 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.

UNIT–IV

Introduction to Airport Engineering Air craft 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

UNIT – V Water Transport Harbours and ports, Types of Harbours; Harbours - layouts, shipping lanes, 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.

BTCE-071-SUSTAINABLE CONSTRUCTION METHODS

Subject Code:		L T P : 3 1 0	Credits: 3
The students will be able to			
CO1	Develop a clear problem statement and research question that guides their project.		
CO2	Identify and select appropriate methodologies and techniques for data collection and analysis.		
CO3	Apply critical thinking and problem-solving skills to analyze and interpret data.		
CO4	Demonstrate proficiency in using relevant tools and technologies for data analysis and visualization.		
CO5	Communicate the results of their project effectively, both in writing and through oral presentations.		

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1			2	3	1	1	1			2
CO2	3		1	1	1	3	1		2			2
CO3	2	1	1	1		3		2	2			2
CO4	3			2		3			1			2
CO5	2	2	1		1	2		1				1
Course Average	2.40	1.34	1.00	1.34	1.34	2.80	1.00	1.34	1.50			

Syllabus

Unit-1

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.

Unit-2

Precast concrete construction methods. Basics of Slip forming for tall structures. Basic construction methods for steel structures. Basics of construction methods for Bridges.

Unit-3

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.

Unit-4

Study and evaluation of current LEED and GRIHA rating for constructionsystem. Detailed case study and analysis of highly successful recent "green construction projects". Guidance to students for the LEED Green Associateprofessional licensing examination.

Unit-5

Environmental impact of materials; life-cycle assessment; material selection to optimize performance; design, evaluation, and production of green construction materials

PROBABILITY METHODS IN CIVIL ENGINEERING

Subject Code:	PROBABILITY METHODS IN CIVIL ENGINEERING	L T P : 3 1 0	Credits: 3
The students will be able to			
CO1	Understand the basic concepts of probability theory and its applications in civil engineering.		
CO2	Develop an understanding of the different probability distributions and their use in modeling various civil engineering problems.		
CO3	Apply probability concepts and techniques to analyze and solve civil engineering problems related to structural design, construction, and maintenance.		
CO4	Understand the importance of risk assessment and management in civil engineering projects.		
CO5	Use appropriate statistical software to perform statistical analysis and probability calculations.		

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3		1	2			1			2
CO2	3	2	3		1	3			1			3
CO3	3	3	3			2						2
CO4	2	2	2			2						2
CO5	3	3	1			2						2
Course Average	2.80	2.60	2.40		1.00	2.20			1.00			2.20

Syllabus

Unit-1

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.

Unit-2

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.

Unit-3

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 randomvariables.

Unit-4 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
Unit-5 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.

BTCE-073-ADVANCE CONCRETE DESIGN

Subject Code:		**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Understand the behavior and properties of concrete and reinforced concrete structures.		
CO2	Develop an understanding of advanced concrete design principles and methods, including limit state design and working stress design.		
CO3	Analyze and design various types of reinforced concrete structures, such as beams, columns, slabs, and footings.		
CO4	Apply advanced design techniques for reinforced concrete structures, including strut-and-tie modeling and shear design.		
CO5	Use appropriate software tools to perform design calculations and simulations.		

CO-PO Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2		2		3		2				1
CO2	3	3		1		1		2				1
CO3	2	3	1			1		2				3
CO4	3	3				3		2				2
CO5	3	2	1	1		2		2				1
Course Average	2.80	2.60	1.00	1.34		2.00		2.00				1.60

Syllabus
Unit-1 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

Unit-2 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
Unit-3 Introduction 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
Unit-4 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.
Unit-5 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.

BTCE-074-Solid Waste Management

Subject Code: BTCE-074	Solid Waste Management	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Students should be able to understand effect of Solid waste on Public health its ecological impacts.		
CO2	Students should be able to understand effect of Solid waste on Public health its ecological impacts.		
CO3	Students should be able to learn about Landfilling: Site selection criteria, landfill layout, and fill sections.		
CO4	Students should be able to Identify the use of Composting & types of composting		
CO5	Students should be able to learn Hazardous wastes: risk assessment, Environmental legislation, Characterization and site assessment, Waste minimization and resource recovery.		

CO-PO Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	3	3	2	2	2	1	1	2	1	2	1	1
CO2	1	2	3	2	2	1	1	1	1	1	1	2
CO3	2	3	3	2	2	2	1	1	1	1	1	1
CO4	1	2	3	1	2	1	1	1	1	1	1	2
CO5	2	2	2	2	2	1	1	1	1	1	1	1
Course Average	1.80	2.40	2.60	1.80	1.20	1.20	1.00	1.20	1.00	1.20	1.00	1.40

Syllabus

Unit-1

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.

Unit-2

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.

Unit-3

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.

Unit-4

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.

Unit-5

Introduction to Hazardous wastes, Definition of Hazardous waste, The magnitude of the problem; Hazardous waste: Risk assessment, Environmentallegislation, 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.

Text Book & Reference Book

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.

BTCE-075-Design of Steel Structures

Subject Code: BTCE-075	Design of Steel Structures	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Students should be able to Learn the design philosophies of steel structures.		
CO2	Students should be able to Design riveted, bolted, pinned and welded connections for steel structures		
CO3	Students should be able to Design of tension steel members..		
CO4	Students should be able to Design of compression steel members		
CO5	Students should be able to Design of various types of steel beams and plate girders		

CO-PO Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	2	2	1	1	1	1	1	1	1
CO2	2	2	3	2	2	1	1	2	1	1	1	1
CO3	2	3	2	3	3	1	1	1	1	1	1	2
CO4	2	2	3	2	2	1	1	1	1	1	1	2
CO5	2	3	2	2	2	1	1	1	1	1	1	1
Course Average	2.20	2.40	2.60	2.20	2.20	1.00	1.00	1.20	1.00	1.00	1.00	1.40

Syllabus

Unit-1

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.

Unit-2

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.

Unit-3

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.

Unit-4

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.

Unit-5

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.

Text Book & Reference Book

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.

BTCE-076- Urban Transportation Planning

Subject Code: BTCE-076	Urban Transportation Planning	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Apply up-to-date information for planning and operation of urban transport.		
CO2	Evaluate relative importance of various modes and their capacities		
CO3	Solve travel demand forecasting problems.		
CO4	Recommend most appropriate transport modes based on performance evaluation.		
CO5	Execute various transportation related surveys.		

CO-PO Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1		1			1						1
CO2	2		1			2				1		1
CO3	2	2	1			3				1		2
CO4	3	3	2			2		1		1		3
CO5	3	2	2			2		1		1		2
Course Average	2.20	2.34	2.34			2.00		1.00		1.00		1.80

Syllabus

Unit-1

Introduction to transportation planning, planning concept, Goals, objective and Importance of transportation planning. Nature of traffic problems incities. 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.

Unit-2

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.
Unit-3 Travel demand: Estimation and fore casting, trip classification, trip generation: factor and methods, multiple regression analysis. Trip distributionmethods, modal split, trip assignment.
Unit-4 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.
Unit-5 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.

Text Book & Reference Book
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.

BTCE-077-Geo-synthetics and Reinforced Soil Structures

Subject Code: BTCE-077	Geo-synthetics and Reinforced Soil Structures	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Understand the basic principles of geosynthetics and reinforced soil structures.		
CO2	Identify different types of geosynthetics and their properties.		
CO3	Analyze the functions of geosynthetics in reinforced soil structures.		
CO4	Design reinforced soil structures using geosynthetics.		
CO5	Evaluate the performance of reinforced soil structures with geosynthetics.		

CO-PO Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2		1		2						2
CO2	3	1	2	1		2		2				2

CO3	3	1	2	1		2		2				2
CO4	3	3	2	1		2		2				2
CO5	3	1	1	1		2		1				2
Course Average	2.80	1.60	1.40	1.00		2.00		1.40				2.00

Syllabus
Unit-1 Introduction to Geo-synthetics, types of geo-synthetics, artificial and natural geo-sythetics and their applications, manufacture of geo-synthetics, strength of reinforced soils, testing of Geo-synthetics
Unit-2 Drainage application of geo-synthetics, filtration applications of geo-synthetics, erosion control using geo-synthetics. Geo-synthetics in flexible payment, introduction to geo-syenthitcs in landfills, geo-synthetics for construction of and fills.
Unit-3 Sustainable infrastructure development, different types of soil retaining structures, design codes for reinforced soil retaining walls, construction aspects of geo-sythetics reinforced soil retaining wall, testing requirements for reinforced soil retaining walls, geo-synthetic reinforced soil embankments.
Unit-4 Design of reinforced soil retaining walls – simple geometry, design of reinforced soil retaining walls – sloped backfill soil, soil embankments supported on geocell mattresses, geo-synthetic reinforced pile systems for high embankments
Unit-5 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
Text Book & Reference Book
1.Koerner, R.M. "Designing with Geosynthetics", Prentice Hall, New Jersey, USA, 4thedition, 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”

BTCE-078-Irrigation and Water Resource Engineering

Subject Code:		L T P : 3 1 0	Credits: 3
The students will be able to			
CO1	Understand the basic concepts and principles of irrigation and water resource engineering.		
CO2	Analyze the factors affecting the design and operation of irrigation systems.		
CO3	Design and select appropriate irrigation systems for different crops and soil types.		
CO4	Analyze and design water storage and distribution systems for agricultural and urban areas.		
CO5	Develop an understanding of water resource management and its importance for sustainable development.		

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2		1			1			
CO2	3	2	1	1		2	1		2		2	
CO3	1	2	1	2		2	1		1		1	
CO4	2	2	1	3		3	1		1		1	
CO5	3	1	2	1		2	1		1			
Course Average	2.20	1.80	1.20	1.80		2.00	1.00		1.20		1.34	

Syllabus

Unit-1

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

Unit-2

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

Unit-3

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 an Irrigation 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 anti-water logging measures, Drainage of water logged land, Types of drains open and closed, spacing of closed drains.

Unit-4

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

Unit-5

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, efficiencyof 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.

Text Book & Reference Book

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

BTCE-079-Disaster Preparedness and Management

Subject Code:BTCE-079	Disaster Preparedness and Management	L T P : 3 1 0	Credits: 3

The students will be able to		
CO1	Understand the basic concepts and principles of disaster preparedness and management.	
CO2	Analyze the factors affecting the likelihood and impact of natural and human-induced disasters.	
CO3	Design and implement disaster preparedness plans and protocols for different types of disasters and communities.	
CO4	Understand the roles and responsibilities of different stakeholders in disaster preparedness and management, including government agencies, NGOs, and communities.	
CO5	Evaluate and select appropriate disaster response strategies and technologies for different scenarios.	

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	3				2		1		1	2
CO2	2	1	3		2	2	2	2	2		1	2
CO3	2	1	2		1	2	2		2		1	2
CO4	2	1	2		1		2		2		1	2
CO5	2	1	2		1	2	3	2	1		1	2
Course Average	2.00	1.00	2.40		1.25	2.00	2.20	2.00	1.60		1.00	2.00

Syllabus

Unit-1

Introduction-Concepts and definitions: disaster, hazard, vulnerability, risks- severity, frequency and details, capacity, impact, prevention, mitigation.

Unit-2

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

Unit-3

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.

Unit-4 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.
Unit-5 Disasters, Environment and Development-Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land-use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods

Text Book & Reference Book
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**

BTCE-751- Concrete Lab

Subject Code: BTCE-751	**Concrete Lab**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Understand the basic principles of concrete technology and the properties of concrete materials.		
CO2	Demonstrate competence in the laboratory testing of concrete materials, including testing of fresh and hardened concrete.		
CO3	Evaluate the performance of concrete materials in terms of strength, durability, and other key properties.		
CO4	Identify good quality construction techniques		
CO5	Identify the quality of the cement		

CO-PO Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3							2	1		
CO2	2	3							2	1		

CO3	1	3							2	1		
CO4	1	2							2	1		
CO5	1	3							2	1		
Course Average	1.80	2.80							2.00	1.00		

Syllabus
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.

Text Book & Reference Book
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

BTCE-752-Mini Project / Internship Assessment

Subject Code: BTCE-752	**Mini Project / Internship Assessment**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Evaluate their learning outcomes from their mini project or internship experience, including the development of new skills, knowledge, and competencies.		
CO2	Demonstrate proficiency in the use of tools and techniques relevant to their mini project or internship, such as data analysis software, laboratory equipment, or project management tools.		
CO3	Develop their professional skills, including communication, teamwork, and problem-solving skills.		
CO4	Apply the knowledge and skills acquired during their mini project or internship to real-world problems.		
CO5	Present their findings and results in a professional manner, using appropriate formats and media.		

CO-PO Mapping												
Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus

- 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 needof 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).

BTCE-753 Project

Subject Code: BTCE-73	**Project**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Solve complex structural problems by applying appropriate techniques and tools.		
CO2	Exhibit good communication skill to the engineering community and society.		
CO3	Demonstrate professional ethics and work culture		
CO4			

CO5		

CO-PO Mapping												
Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus
Project work will be extension of the to work on the topic identified in during beginning of semester. Continuous assessment should be done of the work done by adopting the methodology decided involving numerical analysis/ conduct experiments, collection and analysis of data, etc. There will be pre-submission seminar at the end of semester. After the approval the student has to submit the detail report and external examiner is called for the viva-voce to assess along with guide.

Semester – VIII

BTHU-802-HSMC-II

Subject Code: BTHU-802	PROJECT MANAGEMENT & ENTREPRENEURSHIP	**L T P : 3 1 0**	**Credits: 3**

The students will be able to		
CO1	understand the Need, scope and conceptual model of entrepreneurship	
CO2	Know the Entrepreneurial Idea Generation and Identifying Business Opportunities.	
CO3	understand the Project Management and Project life-cycle Project appraisal	
CO4	Understand about the Preparation of detailed project report, Project finance.	
CO5	Understand about the Social Entrepreneurship Opportunities.	

CO-PO Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus

UNIT – I

Entrepreneurship:

Need, scope, Entrepreneurial competencies & traits, Factors affecting entrepreneurial development, Entrepreneurial motivation (McClellend's Achievement motivation theory), conceptual model of entrepreneurship , entrepreneur vs. intrapreneur; Classification of entrepreneurs; Entrepreneurial Development Programmes.

UNIT-II

Entrepreneurial Idea and Innovation:

Introduction to Innovation, Entrepreneurial Idea Generation and Identifying Business Opportunities, Management skills for Entrepreneurs and managing for Value Creation, Creating and Sustaining Enterprising Model & Organizational Effectiveness.

UNIT-III

Project Management:

Meaning, scope & importance, role of project manager;

Project life-cycle Project appraisal:

Preparation of a real time project feasibility report containing Technical appraisal,;

Environmental appraisal, Market appraisal (including market survey for forecasting future demand and sales) and Managerial appraisal.
UNIT-IV **Project Financing:** Project cost estimation & working capital requirements, sources of funds, capital budgeting, Risk & uncertainty in project evaluation , preparation of projected financial statements viz. Projected balance sheet, projected income statement, projected funds & cash flow statements, Preparation of detailed project report, Project finance.
UNIT-V **Social Entrepreneurship:** Social Sector Perspectives and Social Entrepreneurship, Social Entrepreneurship Opportunities and Successful Models, Social Innovations and Sustainability, Marketing Management for Social Ventures, Risk Management in Social Enterprises, Legal Framework for Social Ventures.

Text Book & Reference Book
1. Innovation and Entrepreneurship by Drucker, P.F.; Harper and Row
2. Business, Entrepreneurship and Management: Rao, V.S.P. ;Vikas
3. Entrepreneurship: Roy Rajeev; OUP.
4. Text Book of Project Management: Gopalkrishnan, P. and Ramamoorthy, V.E.; McMillan
5. Project Management for Engineering, Business and Technology: Nicholas, J.M., and Steyn, H.; PHI
6. Project Management: The Managerial Process: Gray, C.F., Larson, E.W. and Desai, G.V.; MGH

Project

Subject Code:		**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Apply knowledge of mathematics, science & engineering all together to find the solution of problem/project under study.		
CO2	Develop/Design solution of problem under study through literature survey and engineering in-sights with reference to the present context of study.		
CO3	Able to work efficiently as individual investigator as well as in team-work.		
CO4	Prepare presentation and communicate authentically about the problems under study with appropriate solution, at appropriate audience.		
CO5	Draft/write/present/publish 'technical paper' on the problem/project/topic under study at seminar/conference/engineering journal/competition.		

CO-PO Mapping

Course	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

Outcomes												
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus

Text Book & Reference Book

[BTOE-081]FUNDAMENTALS OF DRONE TECHNOLOGY

Subject Code:		L T P : 3 1 0	Credits: 3
The students will be able to			
CO1	Ability to design UAV drone system		
CO2	To understand working of different types of engines and its area of applications.		
CO3	To understand static and dynamic stability dynamic instability and control concepts		
CO4	To know the loads taken by aircraft and type of construction and also construction materials in them.		
CO5			

CO-PO Mapping												
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

CO5												
Course Average												

Syllabus
UNIT–I Introduction to Drones: Introduction to Unmanned Aircraft Systems, History of UAV drones, classification of drones, System Composition, applications.
UNIT-II Design of UAV Drone Systems: Introduction to Design and Selection of the System, Aerodynamics and Airframe Configurations, Characteristics of Aircraft Types, Design Standards and Regulatory Aspects-India Specific, Design for Stealth.
UNIT-III Avionics Hardware of Drones: Autopilot, AGL-pressure sensors-servos-accelerometer – gyros-actuators- power supply-processor, integration, installation, configuration.
UNIT-IV Communication, Payloads and Controls: Payloads, Telemetry, Tracking, controls-PID feedback, radio control frequency range, modems, memory system, simulation, ground test-analysis-trouble shooting.
UNIT-V Navigation and Testing: Waypoints navigation, ground control software, System Ground Testing, System In-flight Testing, Future Prospects and Challenges.

Text Book & Reference Book
1. Reg Austin "Unmanned Aircraft Systems UAV design, development and deployment", Wiley, 2010. 2. Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 1998. 3. Kimon P. Valavanis, "Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy", Springer, 2007 4. Paul G Fahlstrom, Thomas J Gleason, "Introduction to UAV Systems", UAV Systems, Inc, 1998 Dr. Armand J. Chaput, "Design of Unmanned Air Vehicle Systems", Lockheed Martin Aeronautics.

[BTME-082]CLOUD COMPUTING

Subject Code:		**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	describe the fundamental concepts and architectures of cloud computing.		
CO2	identify and evaluate cloud service models and deployment models.		
CO3	analyze cloud computing security and privacy concerns.		
CO4	design and implement cloud-based solutions.		
CO5	apply cloud computing scalability and virtualization techniques.		

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus

UNIT–I

Introduction: Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed, History of Cloud Computing - Cloud Architecture - Types of Clouds -Business models around Clouds – Major Players in Cloud Computing-issues in Clouds - Eucalyptus - Nimbus - Open Nebula, CloudSim.

UNIT-II

Cloud Services: Types of Cloud services: Software as a Service-Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service –Communication as services. Service providers- Google, Amazon, Microsoft Azure, IBM, Sales force.

UNIT-III

Collaborating Using Cloud Services: Email Communication over the Cloud - CRM Management – Project Management-Event Management -Task Management – Calendar - Schedules - Word Processing – Presentation – Spreadsheet - Databases – Desktop - Social Networks and Groupware.

UNIT-IV

Virtualization for Cloud: Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization –System VM, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - supervisors – Xen, KVM, VMware, Virtual Box, Hyper-V.

UNIT-V

Security, Standards and Applications: Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

Hadoop – Map Reduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine

Text Book & Reference Book

1. David E.Y. Sarna, "Implementing and Developing Cloud Application", CRC press 2011.
2. Lee Badger, Tim Grance, Robert Patt-Corner, Jeff Voas, NIST, Draft cloud computing synopsis and recommendation, May 2011.
3. Anthony T Velte, Toby J Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", McGraw Hill 2010.
4. Haley Beard, "Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July 2008.

[BTOE-083] BIOMEDICAL SIGNAL PROCESSING

Subject Code:		**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	understand the characteristics of biomedical signals.		
CO2	apply signal processing techniques to biomedical data.		
CO3	analyze and evaluate different biomedical signal processing techniques.		
CO4	design and implement biomedical signal processing algorithms.		
CO5	apply biomedical signal processing techniques to healthcare applications.		

CO-PO Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus

UNIT–I

Introduction to Bio-Medical Signals: Classification, Acquisition and Difficulties during Acquisition. Basics of Electrocardiography, Electroencephalography, Electromyography & electro-retinography Role of Computers in the Analysis, Processing, Monitoring & Control and image reconstruction in bio-medical field.

UNIT–II

ECG: Measurement of Amplitude and Time Intervals, QRS Detection (Different Methods), ST

Segment Analysis, Removal of Baseline Wander and Power line Interferences, Arrhythmia Analysis, Portable Arrhythmia Monitors
UNIT–III Data Reduction: TurningPoint algorithm, AZTEC Algorithm, Fan Algorithm, Huffman and Modified Huffman Coding, Run Length. Coding.
UNIT–IV EEG: Neurological Signal Processing, EEG characteristic, linear prediction theory, Sleep EEG, Dynamics of Sleep/Wake transition. Study of pattern of brain waves, Epilepsy-Transition, detection and Estimation. EEG Analysis By Spectral Estimation: The Bt Method, Periodogram, Maximum Entropy Method & AR Method, Moving Average Method. The ARMA Methods, Maximum Likelihood Method.
UNIT–V EP Estimation: by Signal Averaging, Adaptive Filtering:- General Structures of Adaptive filters, LMS Adaptive Filter, Adaptive Noise Cancelling, Wavelet Detection:- Introduction, Detection By Structural features, Matched Filtering, Adaptive Wavelet Detection, Detection of Overlapping Wavelets.

Text Book & Reference Book
1. Willis J. Tomkin, "Biomedical Digital Signal Processing", PHI.
2. D. C. Reddy, "Biomedical Signal Processing", McGraw Hill
3. Crommwell Weibel and Pfeifer, "Biomedical Instrumentation and Measurement", PHI
4. Arnon Cohen, "Biomedical Signal Processing (volume-I)", Licrc Press\
5. Rangaraj M. Rangayyan, "Biomedical Signal Analysis A Case Study Approach", John Wiley and Sons Inc.
6. John G. Webster, "Medical instrumentation Application and Design", John Wiley & Sons Inc

[BTOE-084]ENTREPRENEURSHIP DEVELOPMENT

Subject Code:		**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	identify and evaluate entrepreneurial opportunities.		
CO2	develop the skills and competencies required for entrepreneurship.		
CO3	create a comprehensive business plan for a startup venture.		
CO4	Understanding of the legal and regulatory framework for entrepreneurship.		
CO5	analyze and evaluate the success factors for entrepreneurship.		

CO-PO Mapping												
Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus

UNIT–I

Entrepreneurship- definition. growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. Government policy for small scale industry; stages in starting a small scale industry.

UNIT–II

Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

UNIT–III

Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

UNIT–IV

Project Planning and control: The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. profit planning and programming, planning cash flow, capital expenditure and operations. control of financial flows, control and communication.

UNIT–V

Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act. Role of various national and state agencies which render assistance to small scale industries.

Text Book & Reference Book

1. Forbat, John, “Entrepreneurship” New Age International.
2. Havinal, Veerbhadrappa, “Management and Entrepreneurship” New Age International

Joseph, L. Massod, “Essential of Management", Prentice Hall of India

[BTOE-085]INTRODUCTION TO SMART GRID

Subject Code:		L T P : 3 1 0	Credits: 3
The students will be able to			
CO1	Understand the concept and significance of Smart Grid.		
CO2	Learn about the components and infrastructure of Smart Grid.		
CO3	Study the communication and control technologies used in Smart Grid.		
CO4	Understand the challenges and opportunities associated with Smart Grid implementation.		
CO5	Analyze the impact of Smart Grid on the power industry and society.		

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus

UNIT–I

Introduction: Introduction to Smart Grid: Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid. Case study of Smart Grid. CDM opportunities in Smart Grid.

UNIT–II

Smart Grid Technologies: Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation.

UNIT–III

Smart Grid Technologies: Smart Substations, Substation Automation, Feeder Automation, Geographic Information System (GIS), Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air

Energy Storage, Wide Area Measurement System (WAMS), Phase Measurement Unit (PMU), PMUs application to monitoring & control of power system.

UNIT–IV

Microgrids and Distributed Energy Resources: Concept of microgrid, need & application of microgrid, formation of microgrid, Issues of interconnection, protection & control of microgrid, Plastic & Organic solar cells, thin flim solar cells, Variable speed wind generators, fuel cells, microturbines, Captive power plants, Integration of renewable energy sources.

UNIT–V

Power Quality Management in Smart Grid: Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring

Text Book & Reference Book

1. Ali Keyhani, Mohammad N. Marwali, Min Dai, "Integration of Green and Renewable Energy in Electric Power Systems", Wiley.
2. Clark W. Gellings, "The Smart Grid: Enabling Energy Efficiency and Demand Response", CRC Press.
3. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid:
4. Technology and Applications", Wiley.
5. Jean Claude Sabonnadiere, NouredineHadjsaid, "Smart Grids", Wiley Blackwell 19. 6. Stuart Borlase, "Smart Grids (Power Engineering)", CRC Press.
6. Andres Carvallo, John Cooper, "The Advanced Smart Grid: Edge Power Driving Sustainability",Artech House Publishers July 2011.
7. James Northcote, Green, Robert G. Wilson "Control and Automation of Electric Power Distribution Systems (Power Engineering)", CRC Press.
8. MladenKezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert "SubstationAutomation (Power Electronice and Power Systems)", Springer
9. R.C. Dugan, Mark F. McGranghan, Surya Santoso, H. Wayne Beaty, "Electrical Power System Quality", 2nd Edition, McGraw Hill Publication.

[BTOE-086]QUALITY MANAGEMENT

Subject Code:		**L T P : 3 1 0**	**Credits: 3**
The students will be able to			
CO1	Ability to implement quality management systems in organizations.		
CO2	Competence in using statistical process control and quality improvement tools.		
CO3	Analyze and improve processes using Six Sigma, TQM, and Lean methodologies.		
CO4	Understanding of the importance of leadership in ensuring quality.		
CO5	Conduct quality audits, manage suppliers, and maintain documentation.		

CO-PO Mapping												
Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
Course Average												

Syllabus

UNIT–I

Quality Concepts: Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design, Review of design, Evolution of proto type. Control on Purchased Product: Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure. Manufacturing Quality: Methods and techniques for manufacture, inspection and control of product, quality in sales and services, guarantee, analysis of claims.

UNIT–II

Quality Management: Organization structure and design, quality function, decentralization, designing and fitting, organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program. Human Factor in quality Attitude of top management, cooperation of groups, operators attitude, responsibility, causes of apparatus error and corrective methods.

UNIT–III

Control Charts, Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts. Attributes of Control Chart, Defects, construction and analysis of charts, improvement by control chart, variable sample size, construction and analysis of C charts

UNIT–IV

Defects diagnosis and prevention defect study, identification and analysis of defects, correcting measure, factors affecting reliability, MTTF, calculation of reliability, building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle.

UNIT–V

ISO-9000 and its concept of Quality Management, ISO 9000 series, Taguchi method, JIT in some details.

Text Book & Reference Book

1. Lt. Gen. H. Lal, “Total Quality Management”, Eastern Limited, .
2. Greg Bounds, “Beyond Total Quality Management”,McGraw Hill

3. Menon, H.G, "TQM in New Product manufacturing",McGraw Hill

[BTOE-087]INDUSTRIAL OPTIMIZATION TECHNIQUES

Subject Code	INDUSTRIAL OPTIMIZATION TECHNIQUES	L:T:P	Credits
BTOE-802		3:1:0	03

Course Outcome (CO): The Students will be able to	
CO1	Learn the fundamentals of optimization techniques used in industry.
CO2	Understand the optimization techniques for linear and nonlinear systems.
CO3	Understand the concept of simulation modeling for optimization.
CO4	Study various metaheuristic techniques for optimization.
CO5	Learn about industrial applications of optimization techniques.

SYLLABUS

UNIT–I

Linear Programming: Historical development of optimization, engineering application of optimization, formulation of design problems as a mathematical
programing problem. Graphical method of solution, Simplex method, Dual Simplex method and its application in engineering.

Transportation and Assignment: Introduction, Mathematical formulations, optimal solution of transportation model. Assignment problems: mathematical formulation, solution of Assignment models (Hungarian method), variation of the Assignment problem, the travelling sales man problem and their application in Engineering.

UNIT–II

Sequencing and Network Analysis: Introduction of sequencing, General assumptions, n Jobs through 2 machines, n jobs through 3 machines, n jobs through m machines, 2 jobs through m machines and their applications in Engineering.

Network Analysis: Introduction, Network logic (Network or arrow diagram), Rules for drawing network diagrams, time analysis, forward and backward computation CPM and PERT, and their applications in Engineering.

UNIT–III

Theory of Games and Queueing Models: Introduction, 2 person zero sum games, Maximin and minimax principle, game with saddle point and without saddle point,
Principle of dominance, Rectangular games, graphical solution of 2xn or mx2 games.

Queuing model: Introduction, Application of Queuing model, generalized Poisson queuing model, single server models and multiple channel Queuing modeland their applications in Engineering.

UNIT–IV

Dynamic Programming and Simulation: Introduction Formulation of Dynamic Programming Problem, Dynamic Programming Algorithm, Forward recursions, Capital

Budgeting Problem, Cargo-loading Problem. Solution of LPP by DPP

Simulation: Introduction, definition and types of simulation, need for Simulation advantage and disadvantage, application of simulation, simulation procedure, Monte Carlo simulation and their applications in Engineering.

UNIT–V

Inventory Control and Replacement Models: Introduction, types of inventories, Inventory cost, Deterministic and probabilistic (nondeterministic) inventory models and their application in engineering.

Replacement models: Introduction, definition, Replacement of items that deteriorate, Replacement of items that fail suddenly, Equipment Renewal Problem, Individual and Group Replacement policies & their applications in Engineering

BOOKS: REFERENCE

1. Singiresu S. Rao. "Engineering Optimization" Theory and Practice". New Age International, New Delhi.
2. R. Panneerselvam. "Operations Research ". Prentice- Hall of India, New Delhi
3. Eliezer Naddor. "Inventory Systems". John Wiley & Sons, Inc. New York
4. H.A. Taha: Operations Research – An Introduction, Macmillan Publishing Company, Inc., New York.
5. K. Swarup, P.K. Gupta, M. Mohan: "Operations Research", Sultan Chand and Sons, New Delhi.
6. P.K. Gupta, D.S. Hira: "Operations Research" – An Introduction, S. Chand & Company Limited, New Delhi.
7. S.S. Rao: "Optimization Theory and Applications", Wiley Eastern Ltd., New Delhi.
8. J.K. Sharma: "Operations Research: Theory and Applications", Mac Millan India

[BTOE-088]VIROLOGY

Course Objective : Students undergoing this course are expected to

1. Understand the role of viruses in causing diseases.
2. Understand how viruses affect animals and humans.
3. Learn about Small DNA viruses: parvo- and polyoma viruses, and Large DNA viruses: Herpes-adeno-, and poxviruses.
4. Comprehend Retroviruses: structure, classification, life cycle; reverse transcription, HIV, viral pathogenesis, and AIDS.
5. Understand the conventional and modern approaches to vaccine production.

Subject Code	VIROLOGY	L:T:P	Credits
BTME-088		3:1:0	03

3. **Course Outcome (CO):** The Students will be able to

CO1	Understand the diversity, components, and history of viruses.
CO2	Analyze the consequences of virus infection on host macromolecules.
CO3	Demonstrate knowledge of viral diagnostic techniques and counter attack mechanisms.
CO4	Identify and classify different types of viruses and their pathogenesis.
CO5	Evaluate antiviral therapies and modern approaches to virus control.

SYLLABUS
UNIT–I General Concepts: Virus history, Diversity, shapes, sizes and components of genomes.

Isolation and purification of viruses and components.
UNIT–II Consequences of virus infection to animals and human. Viral infection: affect on host macromolecules. Viral infection: establishment of the antiviral state. Viruses counter attack mechanisms. Viral diagnostic techniques: Rapid Antigen testing, RTPCR
UNIT–III Classification of viruses and nomenclatures. +strand RNA viruses-Picorna viruses. Flavi viruses- West Nile virus and Dengue virus. Corona viruses- SARS pathogens. Small DNA viruses: parvo- and polyoma viruses. Large DNA viruses: Herpes-adeno-, and poxviruses. Miscellaneous viruses.
UNIT–IV –ve strand RNA viruses Paramyxo viruses. Orthomyxo viruses: Influenza pathogenesis and Bird flu. Rhabdo viruses: Rabies pathogenesis.. dsRNA viruses- Reo viruses. Retroviruses: structure, classification, life cycle; reverse transcription. Retroviruses: HIV, viral pathogenesis and AIDS.
UNIT–V Antivirals and viral vaccines Viral Vaccines Conventional vaccines-killed and attenuated, modern vaccinesrecombinant proteins, subunits, DNA vaccines, peptides, immunemodulators (cytokines), vaccine delivery and adjuvants, large scale manufacturing- QA/QC issues. Antivirals Interferons, designing and screening of antivirals, mechanism of action, antiviral libraries, antiretrovirals- mechanism of action and drug resistance. Modern approaches of virus control Anti-sense RNA, siRNA, ribozymes.

.

BOOKS AND REFERENCES
1. Antiviral Agents, Vaccines and immunotherapies. Stephen K. Tyring. ISBN 9780367393748 CRC 2. Basic Virology – Edward K Wanger. Blackwell Publication 3. Fundamentals of molecular virology – Acheson and Nicholas H,2011 4. Principles of Virology 2nd edition by S.J.Flint, L.W.Enquist, R.M.Krug,V.R. Racaniello, and A.M.Skalka ASM Press 5. Medical Virology 4th edition by David O.White and Frank J. Fenner. Academic Press

:

[BTOE-089]NATURAL LANGUAGE PROCESSING

Course Objective : Students undergoing this course are expected to

1. Introduce basic concepts in natural language processing (NLP).
2. Understand various approaches to language modeling and text representation.
3. Learn about the techniques used in semantic analysis and generation.
4. Explore advanced NLP topics, such as machine translation and summarization.
5. Apply NLP techniques to real-world problems and evaluate performance.

Subject Code	NATURAL LANGUAGE PROCESSING	L:T:P	Credits
BTOE-089		3:1:0	03

Course Outcome (CO): The Students will be able to	
CO1	Develop an understanding of NLP concepts and techniques.
CO2	Learn to analyze and represent natural language text.
CO3	Gain proficiency in techniques for semantic analysis and generation.
CO4	Understand the challenges involved in advanced NLP tasks.
CO5	Apply NLP techniques to solve real-world problems effectively.

SYLLABUS

UNIT–I

Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax.

UNIT–II

Introduction to semantics and knowledge representation, some applications like machine translation, database interface.

UNIT–III

Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top- Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

UNIT–IV

Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomenon in Language, Handling questions in Context-Free Grammars. Human preferences in Parsing, Encoding uncertainty, Deterministic Parser.

UNIT–V

Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

BOOKS AND REFERENCES
1. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, “NLP: A Paninian Perspective”, Prentice Hall, New Delhi.
2. James Allen, “Natural Language Understanding”, Pearson Education.
3. D. Jurafsky, J. H. Martin, “Speech and Language Processing”, Pearson Education.
4. L. M. Ivansca, S. C. Shapiro, “Natural Language Processing and Language Representation”, AAAI Press, 2000.
5. 5. T. Winograd, Language as a Cognitive Process, Addison-Wesley.

[BTOE-090]HUMAN VALUES IN MADHYASTH DARSHAN

Course Objective : Students undergoing this course are expected to

1. Introduce students to the philosophy of Madhyasth Darshan.
2. Understand the concept of nature and its different classifications.
3. Recognize the interconnectedness of humans and nature.
4. Explore the principles of realizing human goals and prosperity.
5. Examine the conduct of a realized human being and its implications.

Subject Code	HUMAN VALUES IN MADHYASTH DARSHAN	L:T:P	Credits
BTOE-090		3:1:0	03

Course Outcome (CO): The Students will be able to	
CO1	Understand the basics and importance of Madhyasth Darshan.
CO2	Analyze the submergence of nature in space and its evolution.
CO3	Recognize human beings as an indivisible part of nature and their purpose.
CO4	Apply natural, social, and psychological principles for achieving human goals.
CO5	Develop conduct based on Madhyasth Darshan for a happy life and solving present-day problems.

SYLLABUS

UNIT–I

Introduction to Madhyasth Darshan and its Basics,Need to study Madhyasth Darshan; introduction, basic formulations of the darshan; the complete expanse of study and the natural outcome of living according to the darshan.

UNIT–II

Submergence of Nature in Space

The ever-present existence in the form of nature submerged in space; nature classified into two categories – material and consciousness, and four orders; the form, property, natural characteristic and self-organization of the four orders, General direction and process of evolution in the nature/ existence.

UNIT–III

Human Being as an indivisible part of Nature

Human being as an indivisible part of nature; various types (five classes) of human beings; human being in the combination of self and body; purpose of self as realization, prosperity for the body; need of behavior and work for attaining the goals of realization and prosperity

UNIT–IV

Fulfillment of human goal of realization and prosperity

Following natural, social and psychological principles for actualizing the human goal; form of conducive society and order for such practices, study process- achieving realization through self-study and practice while living in such a society (social order).

UNIT–V

Human Conduct based on Madhyasth Darshan

Description of such a realized self, continuity of happiness, peace, satisfaction and bliss through realization, conduct of a realized human being. Possibility of finding solutions to present day problems (such as inequality of rich and poor, man and woman etc.) in the light of it.

BOOKS AND REFERENCES

1. Nagraj, A., "Manav Vyavahar Darshan", Jeevan Vidya Prakashan, 3rd edition, 2003
2. Nagraj, A., "Vyavaharvadi Samajshastra", Jeevan Vidya Prakashan, 2nd edition, 2009.
3. Nagraj, A., "Avartanasheel Arthashastra", Jeevan Vidya Prakashan, 1st edition, 1998.
4. Class notes on "Human Values in Madhyasth Darshan" available on www.uhv.org.in
5. PPTs for "Human Values in Madhyasth Darshan" available on www.uhv.org.in
6. Video lectures on "Human Values in Madhyasth Darshan" on AKTU Digital Education
7. (https://www.youtube.com/watch?v=l4x26FPFJYs&t=1558s)

Semester – VIII

OPEN ELECTIVES IV

[BTOE-091] ELECTRIC VEHICLES

Course Objective : Students undergoing this course are expected to

1. Understand the concept and history of electric vehicles.
2. Learn about the components and architecture of electric vehicles.
3. Analyze different types of EV motors and their comparison.
4. Understand EV batteries and their selection for EVs.
5. Learn about charging system design and its internal components.

Subject Code	ELECTRIC VEHICLES	L:T:P	Credits
BTOE-091		3:1:0	03

Course Outcome (CO): The Students will be able to

CO1	Analyze recent developments and trends in EV technology.
CO2	Compare EVs and IC engine vehicles.
CO3	Understand the computing needs for autonomy in electric vehicles.
CO4	Analyze BMS global price trends and efficiency.
CO5	Design and plan EV charging facilities and integrate energy storage.

SYLLABUS

UNIT–I

Introduction of Electric Vehicles: Concept of Electrified transportation, Past, present status of electric vehicles, Recent developments and trends in electric vehicles, Comparison of EVs and IC Engine vehicles, Understanding electric vehicle components, Basic EV components and architecture, Autonomy and vehicle computing needs.

UNIT–II

Electric Motor Drives for EV applications: Concept of EV motors, Classification of EV motors, Comparison of Electric motors for EV applications, Recent EV motors, BLDC and SRM, axial flux motor. Introduction to power electronics converters, DC-DC converter, speed control of dc motor, BLDC motor driving schemes.

UNIT–III

EV Batteries and Battery Management System: EV batteries, Lead Acid batteries – Basics, Characteristics, Lithium batteries- Basics, Characteristics, Selection of battery for EVs, Smart

battery pack design, Mechanical and reliability aspects of Li Ion packs, UN38 regulation familiarity, Cell balancing in Li Ion, Battery second life and usage in BESS (energy storage systems). BMS - Global price trends, volumetric and gravimetric efficiency trends

UNIT–IV

Charging system design technology for EV applications:

Charging system design considerations, AC & DC Charging, Charging methods, On-board/Off-board chargers,Vehicle to charger communication system, OCPP familiarity cloud and device side, metrology, billing and authentication types, understand the computing needs in a charging system, Understand internal major block diagrams and subsystems of low and high power chargers. IEC61850 and 61851 familiarities, IEC61000, 60950/51, IEC62196 key highlights.

UNIT–V

EV Charging Facility Planning: Identification of EV demand, Impact of EV charging on power grid, Energy generation scheduling, different power sources, centralized charging schemes, Energy storage integration into micro-grid, Overview and applicability of AI for the EV ecosystem, design of V2G aggregator, case studies.

BOOKS AND REFERENCES

1. C.C.Chan, K.T.Chau. Modern Electric Vehicle Technology, Oxford University Press, NY 2001
2. M.Ehsani, Y.Gao, S.E.Gay, A.Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles –Fundamentals, Theory and Design, CRC Press, 2004
3. James Larminie, John Lowry. Electric Vehicle Technology Explained. Wiley 2012
4. NPTEL Course on Electric Vehicles – Part 1 by Dr. Amit Jain, IIT Delhi
5. Tests on Lithium-ion batteries. Available at: https://www.lithium-batterie-service.de/en/un-38.3-test-series
6. Handbook on Battery Energy Storage Systems- ADB, 2018

[BTOE-092]AUTOMATION AND ROBOTICS

Course Objective : Students undergoing this course are expected to

1. Introduce concepts, types, and principles of automation in manufacturing.
2. Study elements of fluid power and its application in pneumatics and hydraulics systems.
3. Analyze and design automated flow lines, single and mixed model production lines, and CNC machine tools.
4. Understand robot classification, components, kinematics, and power transmission systems.
5. Learn robot simulation methods, programming, applications in manufacturing, and cell design.

Subject Code	AUTOMATION AND ROBOTICS	L:T:P	Credits
BTOE-092		3:1:0	03

Course Outcome (CO): The Students will be able to	
CO1	Understand the advantages, goals, and laws of automation and elements of fluid power.
CO2	Identify the classification and types of automatic transfer machines and design production lines.
CO3	Apply CNC machine tools and analyze robot kinematics, power transmission, and end effectors.
CO4	Implement robot simulation methods and program robots for manufacturing operations.
CO5	Design and control robot cells for various applications and understand their limitations.

SYLLABUS

UNIT–I

Automation: Definition, Advantages, goals, types, need, laws and principles of Automation. Elements of Automation. Fluid power and its elements, application of fluid power, Pneumatics vs. Hydraulics, benefit and limitations of pneumatics and hydraulics systems, Role of Robotics in Industrial Automation.

UNIT–II

Manufacturing Automation: Classification and type of automatic transfer machines; Automation in part handling and feeding, Analysis of automated flow lines, design of single model, multimode and mixed model production lines. Programmable Manufacturing Automation CNC machine tools, Machining centers, Programmable robots, Robot time estimation in manufacturing operations.

UNIT–III

Robotics: Definition, Classification of Robots - Geometric classification and Control classification, Laws of Robotics, Robot Components, Coordinate Systems, Power Source. Robot anatomy, configuration of robots, joint notation schemes, work volume, manipulator kinematics,

position representation, forward and reverse transformations, homogeneous transformations in robot kinematics, D-H notations, kinematics equations, introduction to robot arm dynamics.

UNIT–IV

Robot Drives and Power Transmission Systems: Robot drive mechanisms: Hydraulic/Electric/Pneumatics, servo & stepper motor drives, Mechanical transmission method: Gear transmission, Belt drives, Rollers, chains, Links, Linear to Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearings. Robot end Effectors: Classification of End effectors – active and passive grippers, Tools as end effectors, Drive system for rippers. Mechanical, vacuum and magnetic grippers. Gripper force analysis and gripper design.

UNIT–V

Robot Simulation: Methods of robot programming, Simulation concept, Off-line programming, advantages of offline programming. Robot Applications: Robot applications in manufacturing-Material transfer and machine loading/unloading, Processing operations like Welding & painting, Assembly operations, Inspection automation, Limitation of usage of robots in processing operation. Robot cell design and control, Robot cell layouts-Multiple robots & Machine interference.

BOOKS AND REFERENCES

1. An Introduction to Robot Technology, by Coifet Chirroza, Kogan Page.
2. Robotics for Engineers, by Y. Koren, McGraw Hill.
3. Robotic: Control, Sensing, Vision and Intelligence, by Fu, McGraw Hill.
4. Introduction to Industrial Robotics, by Nagrajan, Pearson India.
5. Robotics, by J.J. Craig, Addison-Wesley.
6. Industrial Robots, by Groover, McGraw Hill.
7. Robotic Engineering - An Integrated Approach : Richard D. Klafter Thomas A.
8. Robots & Manufacturing Automation, by Asfahl, Wiley.

[BTOE-093]COMPUTERIZED PROCESS CONTROL

Course Objective : Students undergoing this course are expected to

1. Understand the role and benefits of computers in process control.
2. Learn about the different elements and architectures of computer-aided process control systems.
3. Gain knowledge of industrial communication systems and data transfer techniques.
4. Develop skills in process modeling and control model formulation.
5. Learn advanced strategies for computerized process control and their real-world examples.

Subject Code	COMPUTERIZED PROCESS CONTROL	L:T:P	Credits
BTOE-083		3:1:0	03

Course Outcome (CO): The Students will be able to	
CO1	Ability to design and implement computer-aided process control systems.
CO2	Understanding of the economic benefits and real-world applications of computerized process control.
CO3	Proficiency in using industrial communication systems and computer control process software.
CO4	develop and validate process models for effective process control.
CO5	Knowledge of advanced control strategies and their application in various industries.

SYLLABUS

UNIT–I

Basics of Computer-Aided Process Control: Role of computers in process control, Elements of a computer aided Process control System, Classification of a Computer–Aided Process Control System Computer Aided Process–control Architecture: Centralized Control Systems, Distributed control Systems, Hierarchical Computer control Systems. Economics of Computer-Aided Process control. Benefits of using Computers in a Process control. Process related Interfaces: Analog Interfaces, Digital Interfaces, Pulse Interfaces, Standard Interfaces.

UNIT–II

Industrial communication System: Communication Networking, Industrial communication Systems, Data Transfer Techniques, Computer Aided Process control software, Types of Computer control Process Software, Real Time Operating System.

UNIT–III

Process Modelling for computerized Process control: Process model, Physical model, Control Model, Process modelling. Modelling Procedure: Goals Definition, Information Preparation, Model Formulation, Solution Finding, Results Analysis, Model Validation.

UNIT–IV

Advanced Strategies For Computerised Process control: Cascade Control, Predictive control, Adaptive Control, Inferential control, Intelligent Control, Statistical control.

UNIT–V

Examples of Computerized Process Control: Electric Oven Temperature Control, Reheat

Furnace Temperature control, Thickness and Flatness control System for metal Rolling, Computer-Aided control of Electric Power Generation Plant.

BOOKS AND REFERENCES

1. S. K. Singh, "Computer Aided Process control", PHI.
2. C. L. Smith, "Digital computer Process Control", Ident Educational Publishers.
3. C. D. Johnson, "Process Control Instrumentation Technology", PHI.
4. Krishan Kant, "Computer Based Industrial Control"
5. Pradeep B. Deshpande & Raymond H. Ash, "Element of Computer Process
6. Control with Advance Control Applications", Instrument Society of America, 1981.
7. 6. C. M. Houpis & G. B. Lamond, "Digital Control System Theory",McGraw Hill.

[BTOE-094]DATA WAREHOUSING & DATA MINING

Course Objective : Students undergoing this course are expected to

1. Understand the concept and components of Data Warehousing.
2. Familiarize with Data Warehouse process, technology and schema design.
3. Learn the principles and techniques of Data Mining.
4. Understand classification and clustering algorithms.
5. Learn how to visualize data and its overall perspective.

Subject Code	DATA WAREHOUSING & DATA MINING	L:T:P	Credits
BTOE-094		3:1:0	03

Course Outcome (CO): The Students will be able to

CO1	Design and build a Data Warehouse.
CO2	Implement Data Warehouse process and technology.
CO3	Preprocess data and perform Data Mining.
CO4	Apply classification and clustering algorithms.
CO5	Visualize data and provide insights to stakeholders.

SYLLABUS

UNIT–I

Data Warehousing:

Overview, Definition, Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Mapping the Data Warehouse to a Multiprocessor Architecture, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept.

UNIT–II

Data Warehouse Process and Technology:

Warehousing Strategy, Warehouse /management and Support Processes, Warehouse Planning and Implementation, Hardware and Operating Systems for Data Warehousing, Client/Server Computing Model & Data Warehousing. Parallel Processors & Cluster Systems, Distributed DBMS implementations, Warehousing Software, Warehouse Schema Design

UNIT–III

Data Mining:

Overview, Motivation, Definition & Functionalities, Data Processing, Form of Data Pre-processing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression,

Numerosity Reduction, Discretization and Concept hierarchy generation, Decision Tree

UNIT–IV

Classification:

Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms.

Clustering:

Introduction, Similarity and Distance Measures, Hierarchical and Partitional Algorithms. Hierarchical Clustering- CURE and Chameleon. Density Based Methods DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method – Statistical Approach, Association rules: Introduction, Large Item sets, Basic Algorithms, Parallel and Distributed Algorithms, Neural Network approach.

UNIT–V

Data Visualization and Overall Perspective:

Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, TestingData Warehouse. Warehousing applications and Recent Trends: Types of Warehousing Applications, Web Mining, Spatial Mining and Temporal Mining.

BOOKS AND REFERENCES

1. Alex Berson, Stephen J. Smith “Data Warehousing, Data-Mining & OLAP”, Mc GrawHil.
2. Mark Humphries, Michael W. Hawkins, Michelle C. Dy, “Data Warehousing: Architecture and Implementation”, Pearson Education..
3. I. Singh, “Data Mining and Warehousing”, Khanna Publishing House.
4. Margaret H. Dunham, S. Sridhar ,”Data Mining: Introductory and Advanced Topics” Pearson Education.

[BTOE-095]DIGITAL AND SOCIAL MEDIA MARKETING

Course Objective : Students undergoing this course are expected to

1. Understand the shift from traditional marketing practices to digital marketing practices.
2. Learn marketing strategies and practices for the digital world.
3. Gain knowledge about social media marketing channels and their advertising campaigns.
4. Learn to acquire and engage users through digital channels using various tools and techniques.
5. Explore digital transformation, innovation, and trends in the global and Indian context.

Subject Code	DIGITAL AND SOCIAL MEDIA MARKETING	L:T:P	Credits

BTOE-095		3:1:0	03

Course Outcome (CO): The Students will be able to

CO1	develop digital marketing strategies and practices.
CO2	create and manage social media campaigns.
CO3	acquire and engage users through various digital channels.
CO4	evaluate the effectiveness of digital marketing strategies.
CO5	understand digital transformation, innovation, and trends in the global and Indian context.

SYLLABUS

UNIT–I

Introduction to Digital Marketing: The new digital world - trends that are driving shifts from traditional marketing practices to digital marketing practices, the modern digital consumer and new consumer's digital journey. Marketing strategies for the digital world-latest practices.

UNIT–II

Social Media Marketing -Introduction to Blogging, Create a blog post for your project. Include headline, imagery, links and post, Content Planning and writing. Introduction to Face book, Twitter, Google +, LinkedIn, YouTube, Instagram and Pinterest; their channel advertising and campaigns.

UNIT–III

Acquiring & Engaging Users through Digital Channels: Understanding the relationship between content and branding and its impact on sales, search engine marketing, mobile marketing, video marketing, and social-media marketing. Marketing gamification, Online campaign management; using marketing analytic tools to segment, target and position; overview of search engine optimization (SEO).

UNIT–IV

Designing Organization for Digital Success: Digital transformation, digital leadership principles, online P.R. and reputation management. ROI of digital strategies, how digital marketing is adding value to business, and evaluating cost effectiveness of digital strategies.

UNIT–V

Digital Innovation and Trends: The contemporary digital revolution, digital transformation framework; security and privatization issues with digital marketing Understanding trends in digital marketing – Indian and global context, online communities and co-creation.

BOOKS AND REFERENCES

1.Moutsy Maiti: Internet Mareting, Oxford University Press India

2.Vandana, Ahuja; Digital Marketing, Oxford University Press India (November, 2015).

3.Eric Greenberg, and Kates, Alexander; Strategic Digital Marketing: Top Digital Experts

4.Share the Formula for Tangible Returns on Your Marketing Investment; McGraw-Hill

Professional.
5.Ryan, Damian; Understanding Digital Marketing: marketing strategies for engaging the digital generation; Kogan Page.
6.Tracy L. Tuten & Michael R. Solomon: Social Media Marketing (Sage Publication)

[BTOE-096]MODELING OF FIELD-EFFECT NANO DEVICES

Course Objective : Students undergoing this course are expected to

1. Understand the fundamentals of MOSFET scaling and short channel effects.
2. Analyze the impact of channel engineering and source/drain engineering on device performance.
3. Explore the design of multigate transistors and their advantages over single gate MOSFETs.
4. Evaluate the characteristics of silicon nanowire and carbon nanotube MOSFETs, as well as molecular transistors.
5. Investigate the effects of radiation on SOI MOSFETs and the design of digital, analog, and RF circuits using nano-devices.

Subject Code	MODELING OF FIELD-EFFECT NANO DEVICES	L:T:P	Credits
BTOE-096		3:1:0	03

Course Outcome (CO): The Students will be able to	
CO1	Develop models for MOS electrostatics and analyze MOSFET current-voltage characteristics.
CO2	Design double gate MOS systems and analyze their performance using various parameters.
CO3	Understand the characteristics and design of carbon nanotube and molecular transistors.
CO4	Analyze the effects of radiation on SOI MOSFETs and the performance tradeoffs in digital and analog circuit design.
CO5	Apply the knowledge gained in the course to develop new and innovative field-effect nano devices.

Syllabus

UNIT–I

MOSFET scaling, short channel effects - channel engineering - source/drain engineering - high k dielectric - copper interconnects -strain engineering, SOI MOSFET, multigate transistors – single gate – double gate – triple gate – surround gate, quantum effects – volume inversion – mobility – threshold voltage – inter subband scattering, multigate technology – mobility – gate stack.

UNIT–II

MOS Electrostatics – 1D – 2D MOS Electrostatics, MOSFET Current- Voltage Characteristics – CMOS Technology – Ultimate limits, double gate MOS system – gate voltage effect - semiconductor thickness effect – asymmetry effect – oxide thickness effect – electron tunnel current – two dimensional confinement, scattering – mobility.

UNIT–III

Silicon nanowire MOSFETs – Evaluvation of I-V characteristics – The I-V characteristics for nondegenerate carrier statistics – The I-V characteristics for degenerate carrier statistics – Carbon nanotube –Band structure of carbon nanotube – Band structure of graphene – Physical structure of nanotube – Band structure of nanotube – Carbon nanotube FETs – Carbon nanotube MOSFETs – Schottky barrier carbon nanotube FETs – Electronic conduction in molecules – General model for ballistic nano transistors – MOSFETs with 0D, 1D, and 2D channels – Molecular transistors – Single electron charging – Single electron transistors.

UNIT–IV

Radiation effects in SOI MOSFETs, total ionizing dose effects – single-gate SOI – multi-gate devices, single event effect, scaling effects.

UNIT–V

Digital circuits – impact of device performance on digital circuits –leakage performance trade off – multi VT devices and circuits –SRAM design, analog circuit design – trans conductance - intrinsic gain – flicker noise – self heating –band gap voltage reference – operational amplifier –comparator designs, mixed signal – successive approximation DAC, RF circuits.

BOOKS AND REFERENCES

1. J P Colinge, "FINFETs and other multi-gate transistors", Springer – Series on integrated circuits and systems, 2008

2. Mark Lundstrom, Jing Guo, "Nanoscale Transistors: Device Physics, Modeling and Simulation", Springer, 2006

3 .M S Lundstorm, "Fundamentals of Carrier Transport", 2nd Ed., Cambridge University Press, Cambridge UK, 2000

[BTOE-097]MODELLING AND SIMULATION OF DYNAMIC SYSTEMS

Course Objective : Students undergoing this course are expected to

1. Introduce the concepts of modeling and simulation of dynamic systems
2. Understand bond graph modeling and its application in mechanical, thermal, hydraulic, and electrical systems
3. Explore system models of combined systems and their linearity/non-linearity
4. Study dynamic response and system transfer functions, and analyze their performance measures
5. Learn simulation techniques and applications using SIMULINK and optimization techniques.

Subject Code	MODELLING AND SIMULATION OF DYNAMIC SYSTEMS	L:T:P	Credits
BTOE-097		3:1:0	03

Course Outcome (CO): The Students will be able to

CO1	Ability to model and simulate dynamic systems using MATLAB and Bond Graph modeling
CO2	Proficiency in modeling mechanical, thermal, hydraulic, and electrical systems using Bond Graph modeling
CO3	Understanding of combined system models and linearity/non-linearity of the systems
CO4	analyze and evaluate dynamic response and system transfer functions and their performance measures
CO5	Proficiency in using SIMULINK for simulation, validation and verification of simulation models, and optimization techniques for system identifications.

SYLLABUS

UNIT–I

Introduction to modeling and simulation: Introduction to modeling, Examples of models, modeling of dynamic system, Introduction to simulation, MATLAB as a simulation tool, Bond graph modeling, causality, generation of system equations.

UNIT–II

Bond graph modeling of dynamic system: Methods of drawing bond graph model- Mechanical systems & Electrical systems, some basic
system models- Mechanical systems, Thermal systems, hydraulic systems, pneumatic systems and electrical systems.

UNIT–III

System models of combined systems: Linearity and non-linearity in systems combined rotary and translatory system, electro mechanical system, hydro- mechanical system.

UNIT–IV

Dynamic Response and System Transfer Function: Dynamic response of 1st order system and 2nd order system, performance measures for 2nd order system, system transfer function, transfer function of 1st and 2nd order system Block diagram algebra, signal flow diagram, state variable formulation, frequency response and bode plots.

BOOKS AND REFERENCES

1. Zeigler B.P. Praehofer. H. and Kim I.G. "Theory of modeling and simulation", 2nd Edition. Academic press 2000.
2. Robert L. Woods, Kent L. Lawrence, “Modeling and simulation of dynamic systems”, Person, 1997.
3. Brown, Forbes T. “Engineering System Dynamics”, New York, NY: CRC, 2001. ISBN: 9780824706166.
4. Pratab.R " Getting started with MATLAB" Oxford university Press 2009.