COURSE STRUCTURE

Master of Engineering

(Transportation)

Civil Engineering

Under

Choice Based Credit System (CBCS)

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SEMESTER -I

SR.NO	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	I	FEM110001	RESEARCH SKILL AND METHODOLOGY	2(1+2+0)	MLC
2	I	FEM110002	DISASTER MANAGEMENT	0(2+0+0)	AUDIT 1
3	I	FEM115801	HIGHWAY MATERIALS AND CONSTRUCTION TECHNIQUES	4(3+0+2)	CORE 1
4	I	FEM115802	TRAFFIC ENGINEERING& ROAD SAFETY	4(3+0+2)	CORE 2
5	I	FEM115803	NUMERICAL METHODS AND STATISTICAL ANALYSIS	4(2+2+0)	PROGRAM ELECTIVE I
6	I	FEM115804 FEM115805 FEM115806	1. HIGHWAY GEOMETRIC DESIGN 2. INTELLIGENT TRANSPORTAION SYSTEM 3. RAIL TRANSPORTATION SYSTEM PLANNING AND DESIGN	4(2+2+0)	PROGRAM ELECTIVE II
TOTAL				18	

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SEMESTER -II

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	II	FEM120001	RESEARCH PAPER WRITING	0(2+0+0)	AUDIT 2
2	II	FEM125801	PAVEMENT DESIGN, AND EVALUATION	4(2+2+0)	CORE III
3	II	FEM125802	TRAFFIC FLOW THEORY AND MANAGEMENT	4(3+0+2)	CORE IV
4	II	FEM125803 **FEM125804** FEM125805	1. AIRPORT PLANNING AND DESIGN 2. **DOCKS AND HARBOUR ENGINEERING** 3. PUBLICTRANSPORTATION PLANNING	4(2+2+0)	PROGRAM ELECTIVE III
5	II	**FEM125806** FEM125807 FEM125808	1. **APPLICATION OF GIS AND RS FOR TRANSPORTATIO** 2. BEHAVIORAL TRAVEL MODELING 3. ECONOMIC EVALUTATION OF TRANSPORTATION PROJECTS	4(2+2+0)	PROGRAM ELECTIVE IV
6	II	FEM125809	MINI PROJECT WITH SEMINAR	2(0+0+4)	CORE
TOTAL					18

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SEMESTER -III

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	III	FEM135801	INTERNAL REVIEW -I	2(0+0+4)	INTERNAL REVIEW -1
2	III	FEM135802	DISSERTATION PHASE -I	11(0+0+22)	DISSERTATION
3	III	FEM135803 FEM135804 **FEM135805**	1. COST MANAGEMENT OF ENGINEERING PROJECTS 2. INDUSTRIAL SAFETY 3. **OPERATION RESEARCH**	3(3+0+0)	OPEN ELECTIVE
TOTAL					16

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SEMESTER -IV

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	IV	FEM145801	INTERNAL REVIEW - II	2(0+0+4)	DISSERTATION
2	IV	FEM145802	DISSERTATION PHASE-II	14(0+0+28)	DISSERTATION
TOTAL				16	

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RESEARCH SKILL AND METHODOLOGY (FEM110001)

Credit-2   **L:T:P -:1:0:2**

Unit No	Subject Content	Teaching Hours	(%) Weightage
1	**Introduction to Research:** Nature and Scope of Research, Information Based Decision Making and Source of Knowledge. The Research Process, Basic approaches and Terminologies used in Research, Defining Research Problem and Framing Hypothesis, Preparing a Research Plan **Defining the Research Problem and Research Design** What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Meaning of Research Design, Need for Research Design, Future of a Good Design, Important Concepts Relating to Research Design, Different Research Design, Basic Principals of Experimental Designs	13	31
2	**Sampling Design** Census and sample survey, Implications of a Sample Design, Steps in sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of sample Designs, How to Select a Random Sample? ,Random Sample from an Infinite Universe, Complex Random Sampling Designs **Methods of Data Collection** Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of	14	34

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	Secondary Data, Selection of Appropriate Method for Data Collection		
3	**Data Analysis** Data Analysis and Presentation Editing and coding of data, tabulation, graphic presentation of data, cross tabulation, Testing of hypotheses; Parametric and nonparametric tests for Univariate and Bivariate data. Tests of association; simple linear regression and other non-parametric tests, Sampling techniques, Probability, Probability Distributions, Hypothesis Testing, Level of Significance and Confidence Interval, t-test, ANOVA, Correlation, Regression Analysis	7	12
4	**Interpretation of Data and Paper Writing** Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish? Ethical issues related to publishing, Plagiarism and Self-Plagiarism, Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science Discipline.	4	10
5	**Report Writing** Significance of Report Writing, Deferent Steps in Writing Report. Layout of the Research Report, Types of Report, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing a Research Report **Patent Rights** Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications	4	13

 Reference Books:
1. Research Methodology Methods and Techniques by C. R. Kothari, New Age International Publishers.
2. Research Methodology by D. K. Bhattacharyya, Excel Books Publications.
3. Research Methodology: A Guide for Researchers in Management and Social Sciences by Taylor, Sinha & Ghoshal, PHI Publications

 Course outcome
After completion of the course, the students will be able to:
CO-1: Conduct a quality literature review and find the research gap.
CO-2: Identify an original and relevant problem and identify methods to find its solution.
CO-3: Validate the model

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CO-4: Present and defend the solution obtained in an effective manner in written or spoken form

CO-5 :   take up and implement a research project/ study.

Course Outcomes	Expected Mapping with Programme Outcomes *(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)*											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	3	3	2	3	3	1	2	3	3	-	-
CO-2	2	3	3	2	3	3	1	2	3	3	-	-
CO-3	2	3	3	2	3	3	1	2	3	3	-	-
CO-4	2	3	3	2	3	3	1	2	3	3	-	-
CO-5	2	3	3	2	3	3	1	2	3	3	-	-

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DISASTER MANAGEMENT(FEM110002

Credit-0   **L:T:P -:2:0:0**

Unit	Description in detail	Teaching Hours	Weightage
I	**Introduction:** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	04	17%
II	**Repercussions Of Disasters and Hazards:** Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War And Conflicts	04	17%
III	**Disaster Prone Areas In India:** Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	04	17%
IV	**Disaster Preparedness And Management:** Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness	04	17%
V	**Risk Assessment:** Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And	08	32%

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	Warning, People's Participation In Risk Assessment. Strategies for Survival. **Disaster Mitigation:** Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.		

Reference Books :

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

Course Outcome:

After completion of the course, the students will be able to:

CO-1: Learn to demonstrate a critical understanding of key concepts in disaster risk reduction

and humanitarian response.

CO-2: Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

CO-3: Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations..

CO-4: Critically understand the strengths and weaknesses of disaster management approaches,

planning and programming in different countries, particularly their home country or the

countries they work in.

CO-5: Understand impact of Disasters and realization of societal responsibilities.

CO-6: Apply Disaster management principles

Course Outcomes	Expected Mapping with Programme Outcomes *(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)*											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	2	3	-	-	1	2	2	1	1
CO-2	3	2	2	1	2	-	-	1	3	2	2	1
CO-3	3	3	1	2	1	-	-	1	2	2	2	2

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CO-4	3	3	3	2	2	-	-	-	2	3	2	-
CO-5	3	2	3	2	3	-	-	2	3	2	2	2
CO-6	1	3	2	2	2	-	-	1	3	3	1	2

HIGHWAY MATERIALS AND CONSTRUCTION TECHNIQUES (FEM115801)

Credit- 4   **L:T:P -:3:0:2**

Sr No.	Subject Content	Teaching Hours	Weightage (%)
I	**Subgrade soil:** Fundamental concepts on type, Particle size distribution, Engineering soil classification methods, Phase relationship, Stresses and capillary, Field and laboratory tests, Significance and application of test results, Site investigation. Various additives and admixtures, Their interaction with soil, Laboratory tests for soil stabilization. **Aggregates:** Aggregate sources, Sampling of aggregates, Production of aggregates, Aggregate types, Property sand laboratory tests – their significance and applications of test results, Blending of aggregates. **Cement concrete:** Properties, Additives and admixtures, Concrete mix design procedure, Quality control, Different types of concrete, Reinforced fiber concrete. Concrete mix design.	14	25%
II	**Advanced Pavement Materials:**	04	10%

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	Fly ash, Waste materials, Geosynthetics, Chemicals etc. Different types, Modified bitumen, properties, Significance and application of test results, Recycling of old mixes, Rheology of bituminous binder. Advance tests for bitumen.		
III	**Bituminous mix Design:** Objectives of mixtures, Properties and laboratory Methods. (A) Marshal mix design, (B) Super pave mix design **Equipment:** Various machineries used in road construction.	18	35%
IV	**Construction of road:** Mobilization of man, Material and machineries for road project, Earthwork and construction of earth road, Types of low, Intermediate and high type pavements, Soil-stabilization, WBM, WMM, Gravel Road, Bituminous Road, Cement concrete and pre-stressed cement concrete road pavements ,Roads in desert, Swampy, Black-cotton soil and hilly area. **Highway Drainage:** Design of surface and subsurface drainage.	12	20%
V	**Quality control measures for road and Maintenance:** Periodic and routine maintenance for different types of pavements, strengthening of pavements, Planning schedule for pavement maintenance.	04	10%

Reference Books :

1. Prithvi Singh Kandhal, Bituminous Road Construction in India, PHI Learning Private Limited, 2016.
2. AthanassiosNikolaides, Highway Engineering: Pavement, Mayterials and Control of Quality, CRC Press, 2014.
3. Khanna S.K., Justo C.E.G., Veeraragavan, A Highway Engineering, Nem Chand & Bros., Roorkee, 2014
4. Rajib B. Mallick and Tahar El-Korchi, Pavement Engineering - Principles and Practices, Second Edition, CRC Press,
5. 2013
6. Kadiyali L.R., Principles & Practice of Highway Engineering, Khanna Publishers,2001
7. Khanna, S.K, Justo, C.E.G and Veeraragavan, A, Highway Materials and Pavement Testing, Nem Chand & Bros.,
8. Revised fifth edition, 2009
9. Venkatappa Rao, G, Ramachandra Rao, K, Kausik Pahari and Bhavanna Rao, D,V, Highway Material Testing and
10. Quality Control, I.K. International Publishing House, 2015

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11. Nikolaides,A, Bituminous Mixtures and Pavements, CRC Press, 2015
12. Richard Y. Kim, Asphalt Pavements, CRC Press, 2014.
13. Relevant IRC and IS Codes.
14. MORT&H guidelines

COURSE OUTCOMES

1. Understand the properties of the highway material, their testing and change in behavior in reference to changing climatic parameters. Study horizontal and vertical alignment, including super elevation, which comply standards as per IRC.
2. Design rigid and flexible pavements which comply with IRC: 37 standards, and factor influencing their maintenance
3. Carryout geometric design of highway
4. Know about pavement failures, its maintenance, importance of drainage, hill roads and their challenges.
5. Know about importance and working of different traffic control devices

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	3	3	2	3	2	2	1	1
CO-2	3	2	2	1	2	-	-	-	-	1	2	1
CO-3	3	2	2	1	2	-	2	-	-	2	1	1
CO-4	3	2	2	1	2	-	3	-	-	1	1	1
CO-5	3	2	2	1	2	-	-	-	-	2	1	1
CO-6	3	3	3	2	3	-	1	-	-	2	2	1

TRAFFIC ENGINEERING& ROAD SAFETY (FEM115802)

Credit-4   **L:T:P -:3:0:2**

Sr No.	Subject Content	Teaching Hours	% Weightage
I	Introduction: Basic components of traffic and their characteristics, Fundamental variables of traffic and their interrelationship, headway - measurement techniques and Analysis, microscopic and microscopic parameters of traffic flow	05	10%
II	Highway Capacity, Level of Service – Measurement Techniques, HCM Methods, Design hourly volumes and speed, its uses Transportation surveys- O-D survey, methodology and analysis. Merging – Diverging Flow, Weaving Flow, Length Calculations.	16	50%

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	Traffic Control Devices, Rules, Signs, and Signals – Signal Cycle Time Calculations, Isolated and Co-Ordinated Signals		
III	Traffic planning and design – for pedestrians, intersections, capacity of rotary intersections Traffic Management: TSM Techniques Parking survey, characteristics and interpretation and design	06	10%
IV	Road accidents and safety measures Environmental Impact of Traffic – Air, Noise Pollution Simulation in traffic engineering design	06	15%
V	**Road safety audit and analysis:** Stages, aim and objectives, principles, process, roles and responsibility, Specific parameters, design standards, various stages of road safety audit, RSA for rural roads, Checklists, Structuring of report. Steps in treatment of crash locations, diagnosing crash problem and solutions, accident report form, storing of data, using and interpreting crash data, identifying and prioritizing hazardous locations, condition and collision diagrams; Vulnerable Road users: crashes related to pedestrian and bicyclists, theirsafety,provisionfordisabled;Crashreconstruction:understanding basic physics,calculationofspeedforvariousskid,friction,drag,andaccelerationscenarios.	07 12	15% 15%

Reference Books :

1. L.J.Pingnataro, Traffic Engineering; Theory and Practice. Prentice Hall, Englewood Clitts,1973.
2. M.Wohl and B.V.Martin, Traffic System Analysis for Engineering and Planners, McGraw-Hill. New York,1983.
3. D.R.Drew, Traffic Flow Theory and Control, McGraw Hill. New York1968.
4. W.R.McShane, R.P.Roess and E.S.Prassas, Traffic Engineering, Prentice Hall, New Jersey,1990.
5. R.J.Salter, Highway Traffic Analysis and Design, McMillan, Hampshire,1989.
6. Highway Capacity Manual, Transportation Research Board, Washington D.C., 1997,2000
7. Partho Chakraborty and Animesh Das, Principles of Transportation Engineering, PHI
8. S.C. Saxena, Traffic Planning and Design, DhanpatRai Pub., New Delhi.
9. Dr. L.R Kadiyali, Traffic Engineering & Transportation Planning.

Course Outcome:

After learning the course, the students should be able to

1. To Conduct various types of Traffic survey
2. To provide detailed knowledge of traffic flow characteristics, measurement techniques and analysis.
3. To train the students, how to find the highway capacity and level of service.
4. To make aware of traffic planning, design and management techniques and impacts of traffic.
5. To impart the concepts of design of traffic control devices and traffic infrastructures.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	1	3	1	3	1	1	2	1	-	1
CO-2	3	3	2	2	2	3	-	1	1	1	-	1
CO-3	3	3	2	2	2	3	1	1	2	2	1	1
CO-4	3	3	3	2	2	3	2	1	1	1	1	-
CO-5	3	2	3	2	3	3	2	1	1	2	1	-

NUMERICAL METHODS AND STATISTICAL ANALYSIS – (FEM115803)

Credit-4   **L:T:P -:2:2:0**

Sr No.	Subject Content	Teaching Hours	Weightage (%)
1	Motivation, Data and Decisions, Measurement Uncertainties, Random processes. Various Statistical Measures. Basic Probability, Sample Space, Events, Axioms of Probability, Sample space with equality likely outcomes, Conditional probability, independent events.	7	16%

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2	Random number generation. Sample statistics, empirical distributions, goodness of fit, and sampling from normal populations. Random Variables, Continuous/Discrete random variables, exception, valance, convenience, conditional distributions, moment generating functions. Multiple regressions.	8	18%
3	Distributions, Bernoulli, Binomial, Poisson, Uniform, Normal, Exponential, Chi-square test, t-test and F-test. Interpolation And Curve Fitting Hypothesis testing, Significance Intervals.	8	18%
4	Parameter estimation, moment method, maximum likelihood, interval estimation. Numerical Methods Basic: Summary of basic concepts from Linear algebra and numerical analysis, Matrices. Operation counts, Matrix Norms, Type of Errors in Numerical computation. Numerical Integration Gaussian Quadrature, Romberg Integration, Adaptive Quadrature.	12	27%
5	Matrix Factorization and Linear System Cholesky Factorization, QR factorization by House holder matrices Lufactorization and Gaussian elimination, partial pivoting, error Analysis (statement of result) soling triangular system by substitution, solving full systems by factorization. Lu-factorization for banded and sparse matrices, storage schemes, Iterative Methods, Jacobi, Gauss - Seidal and SOR Iterations, Conjugate gradient method, preconditioning. Interpolation and Curve fitting	10	21%

Reference book:

1. Numerical methods in Engineering - Salvadori& Baron
2. Numerical methods – B S Grewal
3. Numerical Methods in Finite Element Analysis - Bathe & Wilson
4. Numerical methods for scientific and engineering computations – S R K Iyengar, R K Jain and Mahinder
5. Probability and Statistics for Engineers -Miller, Freund-Hall, Prentice India Ltd.
6. Probability and Statistics for Engineers -Johnson Richard, Prentice India Ltd.
7. Introduction to Probability & Statistics for Engineers & Scientists-Ross Sheldon

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8. Sampling techniques-Cochran, Wiley Series.,
9. Statistics-Concepts and Controversies-David S. Moore-Freeman Company, New York.
10. MATLAB an Introduction with Application, Gilat Amos. Willey Pub.
11. Getting Started with MATLAB -PratapRudra -Oxfor Pub
12. Mastering MATLAB 7 -Hanselman-Pearson
13. Programming in MATLAB for Engineers-Chapman S.J.-Cengage Pub.
14. Effective Technical Communication -Rizvi Ashraf-Tata McGraw Hill Pub.
15. Numerical Methods -Balagurusamy E- Tata McGraw Hill Pub.
16. Numerical Methods-Jain M.K.-New Age Pub.
17. Numerical Methods for Engineers-Chapra Steven- Tata McGraw Hill Pub.
18. Computer Oriented Numerical Methods-Rajaraman V.-PHI Pub

COURSE OUTCOMES:

After completion of the course, the students will be able to:

CO-1: Select appropriate numerical methods to apply to various types of problems in engineering.

CO-2: Apply the mathematics concepts underlying the numerical methods considered.

CO-3: Apply numerical methods to obtain approximate solutions to mathematical problems.

CO-4: Carry out interpolations and curve fitting

CO-5: Obtain solution of Eigen value problems and Fourier series for structural analysis

CO-6: Students will learn fundamentals and applications of probability for engineering problems.

Course Outcomes	Expected Mapping with Programme Outcomes *(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)*											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	-	-	2	-	-	-	-	2	1
CO-2	3	2	2	1	2	-	2	-	-	1	-	1
CO-3	3	3	2	2	-	1	2	-	-	2	1	1

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CO-4	3	2	-	-	2	2	2	-	-	1	2	1
CO-5	1	2	2	2	-	1	-	-	-	1	-	1
CO-6	3	2	-	3	2	1	-	-	-	2	2	1

HIGHWAY GEOMETRIC DESIGN (FEM115804)

Credit-4   **L:T:P -:3:0:2**

Sr No.	Subject Content	Teaching Hours	Weightage (%)
I	**Highway Geometrics** Importance, highway system elements-road user and vehicular characteristics, mix traffic characteristics, classification of rural &	10	20%

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University Campus, State Highway-41, Siddhpur - 384151, Dist. Patan, Gujarat, INDIA
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	urban roads, neighborhood roads, roads in residential areas, geometric design factors design speed, topography, traffic & environmental factors.		
II	**Cross-sectional Elements**: Road surface characteristics- evenness, friction & skidding, camber values & implementation, lane width criteria for different modes, kerb, median, road margins, cross-sectional details for different categories of roads. Use of software like open roads (Bentley) or Civil 3D(AUTOCAD) is desirable	10	20%
III	**Sight distances:** Sight distance factors & types, overtaking zones, grade impact, sight distances on head-light criteria.	06	20%
IV	**Alignment:** Alignment issues, factors, horizontal alignment, super-elevation design and implementation, pavement widening, transition curves, setting up of transition curves by surveying equipment's, set back distances, vertical alignment, types of gradients and vertical curves, design of vertical curves & implementation.	10	20%
V	**Intersection Geometrics:** Types of intersections, blind intersections, sight distances, island geometrics, geometrics for merging & diverging, geometrics for bus stop layouts, parking areas & fly-overs, rail-road level crossing.	10	20%

Reference Books :

1.Kadiyali L.R., Principles & Practice of Highway Engineering, Khanna Publishers,2003
2. Khanna S.K., Justo C.E.G., Highway Engineering, Nem Chand & Bros., Roorkee, 2001
3. F. L. Mannering, W. P. Kilareski and S. S. Washburn, Principles of Highway Engineering and Traffic Analysis. Wiley India Pvt. Ltd., New Delhi.
4. James H. Banks, Introduction to Transportation Engineering, WCB-McGraw Hill, New York
5. Relevant IRC codes: IRC:32-1969, IRC:38-1988, IRC:39-1986, IRC:64-1990, IRC:66-1976, IRC:73-1980, IRC:80-1981, IRC:86-1983, IRC:92-1985, IRC:103- 1988, IRC:106-1990, IRC:SP:23-1983, IRC:SP:41-1994 ..

COURSE OUTCOMES

After Learning the course the students shall be able to:

1. Design the longitudinal and cross-Sectional elements of a highway.
2. Design the intersections, interchanges
3. Design the facilities for bicyclists and pedestrians.
4. Design SSD and OSD.

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5. Design Horizontal and vertical curves
6. Design of intersections.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	3	3	1	3	1	1	-	1	-	1
CO-2	3	2	3	2	2	3	1	1	1	1	-	1
CO-3	3	3	3	2	2	3	1	1	2	2	-	1
CO-4	3	3	3	2	2	3	2	1	-	1	-	-
CO-5	3	2	3	2	3	3	2	1	1	2	-	-
CO-6	3	3	3	2	1	3	1	1	1	-	-	1

RESEARCH PAPER WRITING(FEM120001)

Credit-0   **L:T:P -:2:0:0**

Sr No	Subject Content	Teaching Hours	(%) Weightage

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1.	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4	17
2.	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4	17
3.	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check	4	17
4.	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature	4	17
5.	skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions , useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	08	32

Reference Books:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

Course Outcome:

After completion of the course, the students will be able to:

CO 1 Understand that how to improve your writing skills and level of readability.
CO 2 Learn about what to write in each section.
CO 3 Understand the skills needed when writing a Title.
CO 4 Ensure the good quality of paper at very first-time submission
CO 5 Relate the quantum concepts in electron microscopes
CO 6 Describe the unit cell characteristics and the growth of crystals

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Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	-	2	1	3	-	2	3	2	2	2	-
CO-2	3	2	-	-	-	-	-	3	2	-	1	-
CO-3	2	2	2	3	-	-	-	1	2	2	-	-
CO-4	2	-	1	2	-	-	-	3	-	2	-	-
CO-5	3	2	-	1	-	-	-	-	2	-	2	-
CO-6	2	2	3	-	-	-	-	3	2	3	2	-

PAVEMENT DESIGN, AND EVALUATION (FEM125801)

Credit-4   **L:T:P -:3:0:2**

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Sr No.	Subject Content	Teaching Hours	Weightage (%)
I	Types of Pavements – Rigid, Flexible, Highway-Runway Comparison. explore innovative design methods that were developed to investigate distress mechanisms of pavements including alternatives intended to address some environmental performance goals, investigate decision making and design tools that will encourage the use of more sustainable pavement materials and structures, such as permeable pavements, rubber asphalt, recycled asphalt pavement (RAP) and alternative cement binders, and discuss possible applications of pavement design strategies that can have a considerable impact on fuel consumption, vehicle maintenance costs, greenhouse gas (GHG) emissions, and life-cycle costs.	05	12%
II	Stresses in Flexible Pavements – Theories, Analysis. Design of Flexible Pavements – ESWL, Tyre Pressure, Other Factors, Various Methods for Highway and Runways Design, Mix Designs– Bituminous Mixes, Admixtures, Marshall Stability Test, Results, Control.	10	22%
III	Stresses in Rigid Pavements – Theories, Analysis. Design of Rigid Pavements – EWLF, Other Factors Various Methods for Highways and Runways, Design of Joints, Temperature stresses. Pre-stressed Concrete Pavements.	10	22%
IV	Highway Construction Methods: Embankment, Sub- Base, Base and Surface Courses, Bituminous Pavement Construction, Cement Concrete Construction, Materials for road construction, Specification and tests, Macadam construction, surfacing and surface treatment, Road Work in Desert, Swampy, Hilly Area in Problematic Situation.	10	22%
V	Surface and Subsurface Drainage. Pavement evaluation and strengthening: Failures in flexible and rigid pavements, pavement evaluation, deflection survey, serviceability rating techniques, strengthening techniques, maintenance, overlays, replacements.	10	22%

Reference Books :

1. E. J. Yoder and M. W. Witczak, Principles of Pavement Design, John Wiley and Sons, New York, 1975
2. Tang, Pavement Design
3. Sharma & Shrama, Principles and Practice of Highway Engg.
4. Y. H. Huang, Pavement Analysis and Design. Prentice Hall, Englewood Cliffs, New Jersey, USA, 1993, ISBN-0-13-655275-7
5. H.N. Atkins, Highway Construction and Maintenance, Soils, and Concretes, Reston Publishing Company, Reston VA, 1983.
6. J. P. Watson, Highway Construction and Maintenance, Longman Scientific and Technical, New York, 1989.

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7. Relevant IRC, BIS, AASHTO and PCA Specifications and Guidelines.
8. Kadiyali L. R. and Lal, N. B., Principles & Practice of Highway Engineering, Khanna Publishers, Delhi.
9. Khanna S.K., Justo C.E.G., Highway Engineering, Nem Chand & Bros., Roorkee.

Partho Chakraborty and Animesh Das, Principles of Transportation Engineering, PHI

COURSE OUTCOMES

1. To analyse stresses in pavements from given details, information and data set and able to present frameworks for mechanistic-empirical design methods for pavements.
2. To design different types of pavements using standard procedures and have knowledge of failures   in pavements and their preventive measures.
3. To describe various methods of construction of different types of roads and their components, specifications and tests.
4. To assess the problems / causes of failures in road construction in specific conditions and suggest preventive measures thereof.
5. To explain techniques to evaluate strength and serviceability of pavements, evaluation techniques of pavements, describe techniques of maintenance and strengthening, and suggest remedies.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	1	3	3	2	3	2	2	1	1
CO-2	3	2	2	1	2	-	1	1	-	1	2	1
CO-3	3	2	1	2	1	-	2	-	-	2	1	1
CO-4	3	2	2	2	1	-	3	-	1	1	2	1
CO-5	3	2	1	1	2	-	-	-	-	1	1	1
CO-6	3	3	3	2	3	-	1	-	-	1	2	1

TRAFFIC FLOW THEORY AND MANAGEMENT(FEM125802)

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Credit-4 **L:T:P -:3:0:2**

Sr No.	Subject Content	Teaching Hours	Weightage (%)
I	Traffic Stream Characteristics: Measurement, microscopic and macroscopic study of traffic stream characteristics - flow, speed and concentration; use of counting, interval and translated distributions for describing vehicle arrivals, headways, speeds, gaps and lags; fitting of distributions, goodness of fit tests, gap acceptance	10	25%
II	Traffic Stream Models: Fundamental equation of traffic flow, speed-flow-concentration relationships, normalized relationship, fluid flow analogy approach, shock wave theory, platoon diffusion and Boltzmann like behavior of traffic flow, car-following theory, linear and non-linear car-following models, acceleration noise	10	25%
III	Queuing Analysis: Fundamentals of queuing theory, demand service characteristics, deterministic queuing models, stochastic queuing models, multiple service channels, models of delay at intersections and pedestrian	08	15%
IV	Highway Capacity & Level-of-Service Studies: Concepts, factors affecting capacity & level-of service, capacity analysis of different highway facilities, passenger car units, problems in mixed traffic flow	07	10%
V	Traffic Simulation: System simulation, simulation languages, generation of random numbers, generation of inputs – vehicle arrivals, vehicle characteristics, road geometrics, design of computer simulation experiments	10	25%

Reference Books :

1. TRB - SR No.165 - Traffic Flow Theory, Transportation Research Board, Washington - D.C.
2. May, A D., Traffic Flow Fundamentals, Prentice-Hall, NJ
3. Drew, D.R., Traffic Flow Theory and Control, McGraw-Hill, New York.
4. TRB Special Report 209: Highway Capacity Manual, Transportation Research Board, Washington DC, 1985.
5. Wohl M. and Martin, B V., Traffic System Analysis for Engineers and Planners, McGraw-Hill, New York.
6. McShane W R & Roess R P, Traffic Engineering, Prentice-Hall, NJ, 1990.
7. Neylor, T.H. et al., Computer Simulation Techniques, John Wiley.
8. Highway Capacity Manual, Transportation Research Board, Washington DC, 2000,

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2010.
9. Bratley, P., Fox B. L., Schrage, L. E. B., Guide to Simulation, Springer- Verlag, New York 1983.
10. Leigh, J. R., Modelling and Simulation, Peter Peregrinus, London, 1983.
11. Bernard, Z., Theory of Modelling and Simulation, John- Wiley, New York, 1976.
   Ortuzar, J. and Willumsen, L.G, Modelling Transport, Wiley, Chinchestor, 1994.

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DOCKS AND HARBOUR ENGINEERING (FEM125804)

Credit-4   **L:T:P -:3:0:2**

Sr No.	Subject Content	Teaching Hours	Weightage (%)
I	Water Transportation: Scope, Merits, Developments of Water Transportation in India, Inland waterways, River, Canal, Inland water transportation, Development of ports & Harbours, Harbour classification, Site selection, Harbour dimensioning	9	20%
II	Natural Phenomena: Wind, Tides, Water waves, Wave decay & port, wave diffraction, breaking, reflection, Littoral drift, sediment transport, Effects on Harbour and structure design.	9	20%
III	Harbour Infrastructures: Types of breakwaters, jetty, dock fenders, piers, wharves, dolphin, mooring accessories, Repair facilities, wet docks, lift docks, dry docks, gates for graving docks, floating docks, slipways, locks and gates.	9	20%
IV	Port facility: Transit shed, warehouses, cargo handling, container handling, Inland port facility, Navigational aids, types, requirements of signals, lighthouses, beacon light, buoys. Dredging & coastal protection: Types of dredgers, choices, usage of dredged material, sea wall protection-sea wall revetment, bulkhead.	9	20%
V	Planning of ports: regional and intercontinental transportation development, forecasting cargo & passenger demand, regional connectivity, cargo handling capacity of port, economic evaluation of port project, impacts of port activities.	9	20%

Reference Books :

1. Bindra S.P., Docks & Harbour Engineering, Dhanpat Rai Publications,
2. Srinivasan R., Harbours, Docks & Tunnel Engineering, Charotar Publishing House, Anand, 1999.
3. Alonzo Def. Quinn, Design and Construction of Ports and Marine Structure, McGraw - Hill Book Company, New York.
4. Oza H.P., & Oza G.H., Dock & Harbour Engineering, Charotar Publishing House, Anand

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APPLICATION OF GIS AND RS FOR TRANSPORTATIO

Credit-4   **L:T:P -:3:0:2**

Sr No.	Subject Content	Teaching Hours	Weightage (%)
I	**Concept of GIS and RS:** ● What are GIS, RS, and GPS?. ● How GIS and RS have developed over the period? ● GIS for transportation in perspective. ● GIS, GPS and Transportation. **Land use and Transportation Data:** ● Spatial and Non spatial data for land use and ● transportation. ● Traffic Analysis Zone (TAZ) and screen lines. ● Network and Routes.	10	25%
II	**Data base Development:** ● Database domains and transactions. ● RDBMS and Entity Relationship (ER) diagram. ● Data base design.	02	10%
III	**Map Generation and Analysis** ● Concept of map layers. ● Land cover analysis. ● Network creation and linear route building. ● Map accuracy and location expression. ● Generation of Themes and charts.	05	20%
IV	**Transportation Network Development and Algorithms:** ● Network development and management. ● Network properties. ● Shortest path algorithms. ● Transit network and paths.	10	25%
V	**Transportation Models and their Applications in GIS:** ● Transportation and land use Models. ● Linear and Network Models. **GIS-T applications:** ● Background and trends of GIS-T application. ● GIS-T application areas.	07	20%

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1. Hensher D. A., Button K. J., Haynes K. E., and Stopher P. R. (Eds.), Handbook of Transport Geography and Spatial Systems, Elsevier, 2004.
2. Thill Jean-Claude, Geographical Information Systems in Transportation Research, Pergamon, 2000.
3. O'sullivan David, Geographic Information Analysis, John Wiley & Sons, 2003.
4. Longley P. A., Barnsley M. J., Donnay Jean-Paul, Remote Sensing and Urban Analysis, Taylor & Francis, 2001.
5. Caliper Corporation, Travel Demand Modelling with TransCAD, 1998.
6. Michael W., GIS - A Computing Perspective, CRC Press, 2004.

COURSE OUTCOMES

1. To learn the basic concepts of geo-informatics in brief that includes Geographical Information System (GIS), Remote Sensing (RS), and Global Positioning System (GPS).
2. To understand these basic concepts in context of transportation and transportation networks
3. To learn the data needs and database development for doing transportation analysis in GIS environment.
4. To understand the concepts of transportation networks and algorithms and how they are incorporated into GIS
5. To understand how GIS processes can be used for efficient transportation modeling and analysis

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	3	1	3	2	2	2	2	2	1	1
CO-2	3	3	3	1	2	-	1	1	1	1	1	1
CO-3	3	3	3	2	2	-	1	1	-	1	1	1
CO-4	2	3	2	1	1	1	-	-	-	1	2	1
CO-5	3	2	2	1	1	-	-	-	-	1	2	1
CO-6	3	3	3	1	3	-	-	1	1	1	1	1

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MINI PROJECT WITH SEMINAR(FEM125809)

Sr No.	Subject Content	Teaching Hours	(%) Weightage
01	A mini project requires comparatively less time than major projects. They are comparatively simpler and have shorter duration. Mini Project helps students to explore and strengthen the understanding of fundamentals through practical application of theoretical concepts. Mini Project can help them to boost their skills and widen their horizon of thinking. It will act like a beginners guide to undertake the major project/dissertation during the final year and will ensure preparedness of students to undertake major projects/dissertation. Students will be required to select the topic relevant to their specialization and that has value addition. Students will get an opportunity to work in actual industrial environment if they opt for internship. Based on the selected topic student will also prepare seminar report based on the literature survey Mini Project will have mid semester presentation and end semester presentation. Mid semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available. End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution. Continuous assessment of Mini Project at Mid Sem and End Sem will be monitored by the departmental committeeconcept to detailed design & drawing) from above topics along with cost estimation.	56	100

Course Outcomes: - At the end of the course, the student will be able to:
1. Identify engineering problems reviewing available literature.
2. Study different techniques used to analyze complex systems.
3. Solve a live problem using software/analytical/computational tools and present solution by using his/her technique applying engineering principles.

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4. Learn to write technical reports and develop skills to present and defend their work in front of technically qualified audience.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)											
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CO-1	2	1	3	3	-	-	-	-	-	--	-	-
CO-2	2	1	3	3	-	-	-	-	-	--	-	-
CO-3	1	1	2	2	3	-	-	1	1	-	--	-
CO-4	2	2	2	3	1	1	-	-	-	-	-	-

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INTERNAL REVIEW -1(FEM135801)

Credit-2   **L:T:P -:0:0:4**

Sr No.	Subject Content
1.	**Course Objective**: To present a problem oriented in depth knowledge of Mid semester Thesis Progress Review. To address the underlying concepts and methods behind Mid semester Thesis Progress Review
2.	**Instructional Method & Pedagogy** At the start of course, the course delivery pattern, prerequisite of the subject will be discussed. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

Course outcome:

After completion of the course, the students will be able to:

CO-1: The student can identify different areas of mid semester Thesis Progress Review.

CO-2: Can find the applications of all the areas in day to day life.

Course Outcomes	Expected Mapping with Programme Outcomes *(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)*

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	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	1	3	3	-	-	-	-	-	--	-	-
CO-2	2	1	3	3	-	-	-	-	-	--	-	-

DISSERTATION PHASE I(FEM135502)

Credit-8   **L:T:P -:0:0:16**

Sr No.	Subject Content
1.	**Course Objective:** To select topic based on structural engineering related requirement as per the current scenario and work accordingly.
2.	**Instructional Method & Pedagogy** At the start of course, the course delivery pattern, prerequisite of the subject will be discussed. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

After completion of the course, the students will be able to:

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CO-1: At the end of the course, students will gain an experience in reviewing various research papers, understanding various newer concepts of problem solving and finalizing the topic related to the course for the work.

Course Outcomes	Expected Mapping with Programme Outcomes *(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)*											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	1	1	1	3	2	3	3	-	3	-	-	-
CO-2												
CO-3												
CO-4												
CO-5												

OPERATION RESEARCH (FEM135805)

Credit-3   **L:T:P -:3:0:0**

Sr No.	Subject Content	Teaching Hours	(%) Weightage
1.	**Linear Programming Problems:** Formulation of a LPP, - graphical solution, simplex method, duality in LPP, sensitivity analysis, Integer linear programming, revised simplex method, parametric linear programming, Dynamic programming under certainty, Dynamic programming approach for solving LPP.	12	30
2.	**Project Management , Inventory Control and Decision Making:** CPM, PERT, Project time cost trade off, Resource allocation, Deterministic inventory control models, Probabilistic inventory control models, Decision making process, Decision making under uncertainty, Decision making under risk, Decision tree analysis, Theory of games, Pure strategies, Mix strategies,	10	25

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	Solutions method games without saddle points.		
3.	**Classical Optimization Methods:** Single variable optimization, Constrained and unconstrained multi-variable optimization, Direct substitution method, Lagrange's method of multipliers, Kuhn- Tucker conditions	06	12
4.	**Non-linear Programming:** **Constrained Optimization Techniques** Unimodal function, Unrestricted search, Exhaustive search, Dichotomous search, Interval halving method, Fibonacci method, Golden section method **Unconstrained Optimization Techniques** Direct Search Methods: Random search methods, Grid search method, Univariate method, **Constrained Optimization Techniques** Direct Methods: Random search method, Sequential linear programming.	10	25
5.	**Evolutionary Algorithms** An overview of evolutionary algorithms, Simulated annealing algorithm, Genetic algorithm, Particle swarm optimization	04	8

Reference Book:

1. J. K. Sharma, Operation Research, Theory and Application, Macmillan Publishers India Ltd,2013
2. H.A. Taha, Operations Research, An Introduction, PHI, 2008
3. S.S.Rao, Engineering Optimization Theory and Practice, New Age International (P) Ltd, Publishers.
4. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

After completion of the course, the students will be able to:

CO-1: Students should able to apply the Liner programming techniques to solve problems of real life applications and carry out post optimality analysis.

CO-2: Students should able to apply the concepts of non-linear programming and apply

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them for real life
problems.

CO-3: Students should able to obtain quantitative solutions in business decision making under
conditions of certainty, risk and uncertainty

CO-4: Students should able to implement various scientific tools and models that are available in the
subject to take decisions in a complex environment

CO-5: develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems.

Course Outcomes	Expected Mapping with Programme Outcomes *(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)*											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	3	1	3	-	-	-	--	-	-	-
CO-2	3	2	3	1	3	-	-	-	--	-	-	-
CO-3	3	2	3	1	3	-	-	-	--	-	-	-
CO-4	3	2	3	1	3	-	-	-	--	-	-	-
CO-5	3	2	3	1	3	-	-	-	--	-	-	-

Cost Management of Engineering Projects (FEM135803)

Credit:- 3   **L.T.P:- 3:0:0**

Sr No.	Subject Content	Teaching Hours	Weightage (%)
I	Introduction and Overview of the Strategic Cost Management Process	02	05%
II	Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making	07	20%
III	Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making	07	20%

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IV	Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing	20	40%
V	Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.	06	15%

Reference Books :

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd

Course outcome:

After successful completion of the course, it is expected that student will be able to:

● Understand the concept of strategic cost management, strategic cost analysis – target costing, life cycle costing and Kaizen costing and the cost drive concept.
● Describe the decision-making; relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system.
● Understand the meaning and different types of project management and project execution, detailed engineering activities.
● Understand the project contracts, cost behaviour and profit planning types and contents, Bar charts and Network diagram.
● Analyse by using quantitative techniques for cost management like PERT/CPM.

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Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	2	2	2	2	3	2	-	1	2	1
CO-2	2	3	2	1	1	1	1	2	1	1	1	1
CO-3	2	3	3	3	2	-	-	1	-	1	1	1
CO-4	3	3	3	2	-	1	-	1	1	2	1	1
CO-5	2	2	3	1	2	-	-	1	-	1	2	1
CO-6	3	2	3	2	3	-	1	1	1	2	2	2

INTERNAL REVIEW – 2 (FEM145801)

Credit-2   **L:T:P -:0:0:4**

Sr No.	Subject Content
1.	**Course Objective**: To present a problem oriented in depth knowledge of Mid semester Thesis Progress Review. To address the underlying concepts and methods behind Mid semester Thesis Progress Review
2.	**Instructional Method & Pedagogy** At the start of course, the course delivery pattern, prerequisite of the subject will be discussed. Lecture may be conducted with the aid of

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multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
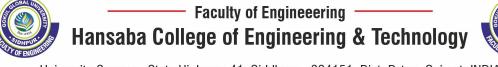
Course outcome :

After completion of the course, the students will be able to:

CO-1: The student can identify different areas of mid semester Thesis Progress Review.
CO-2: Can find the applications of all the areas in day to day life.

Course Outcomes	Expected Mapping with Programme Outcomes *(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)*											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	1	3	3	3	1	-	-	-	--	-
CO-2	3	2	1	3	3	3	1	-	-	-	--	-

DISSERTATION PHASE II(FEM145801)

Sr No.	Subject Content
1.	**Course Objective**: To present a problem oriented in depth knowledge of Dissertation Phase II. To address the underlying concepts and methods behind Dissertation Phase II
2.	**Instructional Method & Pedagogy** At the start of course, the course delivery pattern, prerequisite of the subject will be discussed. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation. Assignment based on course

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content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

Course outcome:

After completion of the course, the students will be able to:

CO-1: The student can identify different areas of Dissertation Phase II.
CO-2: Can find the applications of all the areas in day to day life .

Course Outcomes	Expected Mapping with Programme Outcomes *(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)*											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	1	1	1	3	3	1	-	-	-	-	-
CO-2	3	1	1	1	3	3	1	-	-	-	-	-

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