EKLAVYA UNIVERSITY
ज्ञान प्रासये लक्ष्य संधानम्
Estd. by Madhya Pradesh Niji Vishvavidyalaya (Sthapna Evam Sanchalana) Adhyadesh, 2020

SCHOOL OF ENGINEERING

SYLLABUS

TRANSPORTATION ENGINEERING

Class		M.TECH.	L	T	P	C
Semester/Year		III/II	3	0	0	3
Subject Name		Advanced Airport Engineering				
Subject Code		MCETH20S301				
Paper	English	English				
	Hindi					
Max. Marks		100				

Course objective:
1. To develop an understanding of the aviation system, its functions.
2. The airport planning process, as well as to impart knowledge.
3. Techniques on the conduct of the various elements of master planning and the design of basic airport facilities.

Course outcomes:
At the end of this course, students will be able to:
CO1: Develop an aviation system.
CO2: Students will be able its functions, and the airport planning process.
CO3: Impart knowledge and techniques on the conduct of the various elements of master planning.
CO4: Design of basic airport facilities.
CO5: Understand the aviation system and its functions.

Unit	Syllabus	Periods
UNIT-I	Air transportation; Classification and size of airports; Aircraft characteristics; Air traffic control.	8
UNIT-II	Airport location and necessary surveys; Planning, layout and design of runways, taxiways and aprons; Terminal service facilities - passenger, baggage and cargo handling systems; Lighting, visual aids, airport drainage.	9
UNIT-III	Airport Cargo Facilities: Introduction, Functions and Design Factors of Terminals, Pallets, Containers, Apron Cargo Handling.	11
UNIT-IV	Operations and scheduling; Ground transportation facilities, Airport capacity and delays analysis, Airport Access: Access Modes, Access Modal Choice Modal, Parking Space, Curb front Design, Capacity of Access Routes.	13
UNIT-V	Airport Drainage and Pavement Design: Estimation of Runoff, Collection of Runoff, Subsurface Drainage, Flexible and Rigid Pavement Design.	14

Text books:
1. N.J. Ashford, S. Mumayiz, P. H. Wright, and Airport Engineering: Planning, Design and Development of 21st Century Airports, John Wiley and Sons.
2. S. C. Rangwala and P. S. Rangwala, Airport Engineering, Charotar Publishing House Pvt. Limited.

Referencesbooks:
1. R. Horonjeff, F. McKelvey, W. Sproule, Planning and Design of Airports, McGraw Hill Publication.
2. S.K. Khanna, M.G. Arora and S.S. Jain, Airport Planning and Design, Nem Chand & Brothers.

SYLLABUS

TRANSPORTATION ENGINEERING

Class		M.TECH.	L	T	P	C
Semester/Year		III/II	3	0	0	3
Subject Name		**Advanced Highway Construction**				
Subject Code		**MCETH20S302**				
Paper	**English**	**English**				
	Hindi					
Max. Marks		**100**				

Course objective:
 1. To study the properties and test on aggregate, bituminous materials, composites and recycled waste products.
 2. To be introduced to the principles of bituminous pavement construction.
 3. To learn the procedure for bituminous and PCC mix design.

Course outcomes:
At the end of this course, students will be able to:
CO1: Explain procedure for embankment construction, different types of pavement constructions.
CO2: Process of recycling of pavement materials.
CO3: Interpret the technology of construction for construct earthen, gravel, water bound and wet mix macadam roads.
CO4: Deploy labor and machinery in road construction effectively.
 CO5: Explain design guide lines for roads for hilly, swampy and desert areas.

Unit	Syllabus	Periods
UNIT-I	Various types of equipment for excavation, grading and compaction - their working principle, advantages and limitations. Special equipment for bituminous and cement concrete pavement, stabilized soil road construction.	**8**
UNIT-II	Principles of gradation/proportioning of soil-aggregate mixes and compaction; Design factors, mix design, construction control and quality control, checks for mechanical, soil- cement, soil-bitumen and soil-lime stabilization methods. Use of additives, Numerical problems on mix design and application of Rothfutch method.	**9**
UNIT-III	Preparation of Sub grade, Base and Sub bases, Construction of Water Bound Macadam (WBM), Wet Mix Macadam (WMM), Cement treated bases, Dry Lean Concrete (DLC), Bituminous Constructions: Types of Bituminous Constructions, Interface Treatments, Bituminous Surfacing and wearing Courses for roads and bridge deck slabs, Selection of wearing Course under different Climatic and Traffic conditions, IRC specifications, Construction techniques and QualityControl.	**11**

UNIT-IV	Concrete road construction: Test on Concrete mixes, Construction equipments, Method of construction of joints in concrete pavements, Quality Control in Construction of Concrete pavements, Construction of Continuously reinforced, Prestressed, Steel Fibre Reinforced (SFRC) Pavements, IRC, MORT&H, ACI Specifications, AASHTO Specifications, Recycled pavements, Non –Conventional Pavements, Overlay Construction.	**13**
UNIT-V	Highway Drainage: Design and construction of surface and sub-surface drainage system for highways. Drainage materials, design procedures and IRC Guidelines for Drainage of UrbanRoads. Hill Roads Construction: Stability of Slopes, Landslides–Causes and Control measures, Construction of Bituminous and Cement Concrete roads at high altitudes, Hill road drainage, Construction and maintenance problems and remedial measures.	**14**

Text books:
1. C. A. O' Flaherty, Highways – The Location, Design, Construction, & Maintenance of Pavements, Butterworth Heinemann, 2002.

References books:
1. Specifications for Road and Bridge Work (4th Revision), Ministry of Road Transport and Highways, 2001.

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SYLLABUS

TRANSPORTATION ENGINEERING

Class		M.TECH.	L	T	P	C
Semester/Year		III/II	3	0	0	3
Subject Name		Pavement Maintenance and Management Systems				
Subject Code		MCETH20S303				
Paper	English	English				
	Hindi					
Max. Marks		100				

Course objective:
1. To be aware of the organizational structure of transport corporations and their interactions.
2. To learn about depot facilities and terminals.
3. To understand economic analysis of transport projects.

Course outcomes:
At the end of this course, students will be able to:

CO1: Aware of significance of pavement Management System in improving riding quality for long time at reasonable cost.
CO2: Learn various techniques of assessment of data management, pavement performance etc.
CO3: Enhance the knowledge of overlay design, optimum design and related computer application.
CO4: Understand the Motor Vehicle Act and statutory provision for road transport.
CO5: Do scheduling of route, vehicle and crew.

Unit	Syllabus	Periods
UNIT-I	Components of pavement management systems, pavement maintenance measures.	8
UNIT-II	Pavement performance evaluation: general concepts, serviceability, pavement distress survey systems, performance evaluation and data collection using different equipment. Non-destructive Techniques.	9
UNIT-III	Evaluation of pavement distress modelling and safety; pavement performance prediction: concepts, modelling techniques, structural conditions deterioration models, mechanistic and empirical models, HDM-IV models, comparison of different deterioration models, functional and structural conditions, deterioration models.	11
UNIT-IV	Ranking and optimization methodologies: recent developments, economic optimization of pavement maintenance and rehabilitation.	13
UNIT-V	Project network management, Life cycle cost analysis. Pavement Management Implementation and Expected Benefits.	14

Text books:
1. Ralph Haas and Ronald W. Hudson, Pavement Management System, McGraw Hill Book Co.

Referencesbooks:
1. A. M. Shiyab, Optimum Use of Pavement Condition Indicators in Pavement Management, VDM Verlag.
2. J. Yeaman, I.K. Lee (eds.), Handbook of Pavement Management: Principles and Practice of Management System Based on Visual Rating of Pavement Condition, Unisearch Limited SAMI Pvt Ltd.

SYLLABUS

TRANSPORTATION ENGINEERING

Class		M.TECH.	L	T	P	C
Semester/Year		III/II	3	0	0	3
Subject Name		BUSINESS ANALYTICS				
Subject Code		MCETH20S304				
Paper	English	English				
	Hindi					
Max. Marks		100				

Course Objectives:
1. Understand the role of business analytics within an organization.
2. Analyze data using statistical and data mining techniques.
3. Understand relationships between the underlying business processes of an organization.

Course Outcomes: At the end of the course, students will be able to:

CO1. Demonstrate knowledge of data analytics.
CO2. Demonstrate the ability of think critically in making decisions based on data and deep analytics.
CO3. Demonstrate the ability to use technical skills in predicative.
CO4. Support business decision-making.
CO5. Demonstrate the ability to translate data into clear, actionable insights.

Unit	Syllabus	Periods
UNIT-I	Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.	8
UNIT-II	Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression.Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.	9
UNIT-III	Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Businessanalytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling,Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.	11

UNIT-IV	Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a LinearTrend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle SimulationUsing Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.	**13**
UNIT-V	Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making. Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.	**14**

Text Books:
  1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G., Christopher M. Starkey, Pearson FT Press.
  2. Business Analytics by James Evans, Pearson Education.

Reference Books:
  1. H. G. Stoll, "Least cost Electricity Utility Planning", Wiley Interscience Publication, USA,1989.
  2. I. J. Nagarath and D. P. Kothari, .Modern Power System Engineering., Tata McGraw Hill publishers, New Delhi, 1995.
  3. IEEE Bronze Book- "Recommended Practice for Energy Conservation and cost effective planning in Industrial facilities", IEEE Inc, USA.

SYLLABUS

TRANSPORTATION ENGINEERING

Class		M.TECH.	L	T	P	C
Semester/Year		III/II	3	0	0	3
Subject Name		Industrial Safety				
Subject Code		MCETH20S305				
Paper	English	English				
	Hindi					
Max. Marks		100				

Course Objectives:

1. Industrial safety is needed to check all the possible chances of accidents for preventing loss of life and permanent disability of any industrial employee, any damage to machine and material.

2. It is needed to eliminate accidents causing work stoppage and production loss.

3. It is needed to reduce workman's compensation, insurance rate, and all the cost of accidents.

Course Outcomes: At the end of the course, students will be able to:

CO1: The safety and productivity of people, machines, and processes is a key element of any sustainable business.

CO2: Industrial safety systems have been used for many years to perform safety functions in the manufacturing industries.

CO3: Safety is best achieved by inherently safe process design, Protection layer systems such as sensors, alarms, and personal protection equipment.

CO4: Apply standard safety procedures in an industrial environment.

CO5: Address any residual identified and counter risk.

Unit	Syllabus	Periods
UNIT-I	**Industrial safety:** Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.	8
UNIT-II	**Fundamentals of maintenance engineering:** Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.	9
UNIT-III	**Wear and Corrosion and their prevention:** Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication,	11

	Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.	
UNIT-IV	**Fault tracing:** Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, Electrical motors, Types of faults in machine tools and their general causes.	**13**
UNIT-V	**Periodic and preventive maintenance:** Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.	**14**

Text Books:
 1. Maintenance Engineering, H. P. Garg, S. Chand and Company.

Reference Books:
1. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
2. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.
3. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.

SYLLABUS

TRANSPORTATION ENGINEERING

Class		M.TECH.		L	T	P	C
Semester/Year		III/II		3	0	0	3
Subject Name		Operation Research					
Subject Code		MCETH20S306					
Paper	English	English					
	Hindi						
Max. Marks		100					

Course objective:
1. Understand the role and application of PERT/CPM for project scheduling.
2. Know how to compute the critical path and the project completion time. Know how to convert optimismic.
3. Most probable and pessimistic time estimates into expected activity time estimates.

Course outcomes:
 At the end of this course, students will be able to:
CO1: Apply the dynamic programming to solve problems of discreet and continuous variables.
CO2: Apply the concept of non-linear programming.
CO3: Carry out sensitivity analysis and to model the real-world problem and simulate it.
CO4: Understand the importance of ground improvement techniques in civil engineering construction activities.
CO5: Design using steel strip or geo-reinforcement.

Unit	Syllabus	Periods
UNIT-I	Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.	**8**
UNIT-II	Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming.	**9**
UNIT-III	Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT.	**11**
UNIT-IV	Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.	**13**
UNIT-V	Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation.	**14**

Text books:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008

2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.

Referencesbooks:

1. J.C. Pant, Introduction to Optimization: Operations Research, Jain Brothers, Delhi, 2008.

2. Hitler Libermann Operations Research: McGraw Hill Pub, 2009.

3. Pannerselvam, Operations Research: Prentice Hall of India, 2010.

4. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India, 2010.

SYLLABUS

TRANSPORTATION ENGINEERING

Class		M.TECH.	L	T	P	C
Semester/Year		III/II	0	0	20	10
Subject Name		Dissertation I				
Subject Code		MCETH20S307				
Paper	English	English				
	Hindi					
Max. Marks		250				

Course Objectives:
Students should demonstrate skills related to performing a group project activity. The students should be able to undertake and execute a major project.
Course outcomes:
At the end of the Subject, students will be able to:
CO1: Identify structural engineering problems reviewing available literature.
CO2: Identify appropriate techniques to analyze complex structural systems.
CO3: Applyengineeringandmanagementprinciplesthroughefficienthandlingofproject.

Contents	Periods
Dissertation-I 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 and must bring out individuals 'contribution. Continuous assessment of Dissertation – I and Dissertation – II at Mid Sem and End Sem will be monitored by the departmental committee.	20

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TRANSPORTATION ENGINEERING

Class	M.TECH.	L	T	P	C
Semester/Year	IV/II	0	0	32	16
Subject Name	Dissertation II				
Subject Code	MCETH20S401				
Paper	English	English			
	Hindi				
Max. Marks	500				

Course Objectives:
Students should demonstrate skills related to performing a group project activity. The students should be able to undertake and execute a major project.
Course outcomes:
At the end of the Subject, 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.

Contents	Periods
Dissertation-I 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 and must bring out individuals 'contribution. Continuous assessment of Dissertation – I and Dissertation – II at Mid Sem and End Sem will be monitored by the departmental committee.	32