

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY
(Formerly West Bengal University of Technology)
Master of Technology- Electronics and Telecommunication
Specialization: Communications
(Effective from Academic Session 2018-19)
Semester-III

Subject Code : MCE 301A	Category : Program Elective-V
Subject Name :High Performance Networks	Semester :III
L-T-P : 3-0-0	Credit: 3
Pre-Requisites:	

Course Outcomes:

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

- Apply knowledge of mathematics, probability, and statistics to model and analyze some networking protocols.
- Design, implement, and analyze computer networks.
- Identify, formulate, and solve network engineering problems.
- Show knowledge of contemporary issues in high performance computer networks. Use techniques, skills, and modern networking tools necessary for engineering practice.

Syllabus Contents:

Unit 1: Types of Networks, Network design issues, Data in support of network design. Network design tools, protocols and architecture. Streaming stored Audio and Video, Best effort service, protocols for real time interactive applications, Beyond best effort, scheduling and policing mechanism, integrated services, and RSVP-differentiated services.

Unit 2: VoIP system architecture, protocol hierarchy, Structure of a voice endpoint, Protocols for the transport of voice media over IP networks. Providing IP quality of service for voice, signaling protocols for VoIP, PSTN gateways, VoIP applications.

Unit 3: VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. MPLS operation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P connections.

Unit 4: Traffic Modeling: Little's theorem, Need for modeling, Poisson modeling, Non-poisson models, Network performance evaluation.

Unit 5: Network Security and Management: Principles of cryptography, Authentication, integrity, key distribution and certification, Access control and fire walls, attacks and counter measures,

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security in many layers.

Unit 6: Infrastructure for network management, The internet standard management framework – SMI, MIB, SNMP, Security and administration, ASN.1.

References:

- Kershenbaum A., “Telecommunications Network Design Algorithms”, Tata McGraw Hill, 1993.
- Larry Peterson & Bruce David, “Computer Networks: A System Approach”, Morgan Kaufmann, 2003.
- Douskalis B., “IP Telephony: The Integration of Robust VoIP Services”, Pearson Ed. Asia, 2000.
- Warland J., Varaiya P., “High-Performance Communication Networks”, Morgan Kaufmann, 1996.
- Stallings W., “High-Speed Networks: TCP/IP and ATM Design Principles”, Prentice Hall, 1998.
- Leon Garcia, Widjaja, “Communication networks”, TMH 7th reprint 2002.
- William Stalling, “Network security, essentials”, Pearson education Asia publication, 4th Edition, 2011.

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Subject Code : MCE 301B	Category : Program Elective-V
Subject Name :Pattern Recognition and Machine Learning	Semester :III
L-T-P : 3-0-0	Credit: 3
Pre-Requisites:	

Course Outcomes:

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

- Study the parametric and linear models for classification
- Design neural network and SVM for classification
- Develop machine independent and unsupervised learning techniques.

Syllabus Contents:

Unit 1

Introduction to Pattern Recognition: Problems, applications, design cycle, learning and adaptation, examples, Probability Distributions, Parametric Learning - Maximum likelihood and Bayesian Decision Theory- Bayes rule, discriminant functions, loss functions and Bayesian error analysis

Unit 2

Linear models: Linear Models for Regression, linear regression, logistic regression Linear Models for Classification

Unit 3

Neural Network: perceptron, multi-layer perceptron, backpropagation algorithm, error surfaces, practical techniques for improving backpropagation, additional networks and training methods, Adaboost, Deep Learning

Unit 4

Linear discriminant functions - decision surfaces, two-category, multi-category, minimum squared error procedures, the Ho-Kashyap procedures, linear programming algorithms, Support vector machine

Unit 5

Algorithm independent machine learning – lack of inherent superiority of any classifier, bias and variance, re-sampling for classifier design, combining classifiers

Unit 6

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Unsupervised learning and clustering – k-means clustering, fuzzy k-means clustering, hierarchical clustering

References:

- Richard O. Duda, Peter E. Hart, David G. Stork, “Pattern Classification”, 2nd Edition John Wiley & Sons, 2001.
- Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, “The Elements of Statistical Learning”, 2nd Edition, Springer, 2009.
- C. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.

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Subject Code : MCE 301C	Category : Program Elective-V
Subject Name :Remote Sensing	Semester :III
L-T-P : 3-0-0	Credit: 3
Pre-Requisites:	

Course Outcomes:

At the end of this course, students shall be able to

- Understand basic concepts, principles and applications of remote sensing, particularly the geometric and radiometric principles;
- Provide examples of applications of principles to a variety of topics in remote sensing, particularly related to data collection, radiation, resolution, and sampling.

Syllabus Contents:

Unit 1: Physics Of Remote Sensing: Electro Magnetic Spectrum, Physics of Remote Sensing Effects of Atmosphere-Scattering-Different types-Absorption-Atmospheric window-Energy interaction with surface features -Spectral reflectance of vegetation, soil and water atmospheric influence on spectral response patterns-multi concept in Remote sensing.

Unit 2: Data Acquisition: Types of Platforms-different types of aircrafts-Manned and Unmannedspacecrafts-sun synchronous and geo synchronous satellites -Types and characteristics ofdifferent platforms -LANDSAT,SPOT,IRS,INSAT,IKONOS,QUICKBIRDetc

Unit 3: Photographic products, B/W, color, color IR film and their characteristics -resolving power of lens and film -Opto mechanical electro optical sensors -across track and along track scanners-multispectral scanners and thermal scanners-geometric characteristics of scanner imagery -calibration of thermal scanners.

Unit 4: Scattering System: Microwave scatterometry, types of RADAR -SLAR -resolution - range and azimuth -real aperture and synthetic aperture RADAR. Characteristics of Microwave images topographic effect-different types of Remote Sensing platforms -airborne and space bornesensors -ERS, JERS, RADARSAT, RISAT -Scatterometer, Altimeter-LiDAR remote sensing.principles, applications.

Unit 5: Thermal And Hyper Spectral Remote Sensing: Sensors characteristics-principle of spectroscopy-imaging spectroscopy-field conditions, compound spectral curve, Spectral library, radiative models, processing procedures, derivative spectrometry, thermal remote sensing - thermal sensors, principles, thermal data processing, applications.

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Unit 6: Data Analysis: Resolution–Spatial, Spectral, Radiometric and temporal resolution–signal to noise ratio–data products and their characteristics–visual and digital interpretation–Basic principles of data processing –Radiometric correction–Image enhancement–Image classification–Principles of LiDAR, Aerial Laser Terrain Mapping.

References:

- Lillesand T.M., and Kiefer,R.W. Remote Sensing and Image interpretation, John Wiley & Sons-2000, 6thEdition

- John R. Jensen, Introductory Digital Image Processing: A Remote Sensing Perspective, 2nd Edition, 1995.

- John A.Richards, Springer –Verlag, Remote Sensing Digital Image Analysis,1999.

- Paul Curran P.J. Principles of Remote Sensing, ELBS; 1995.

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Subject Code : MCE 302 A	Category : Open Elective
Subject Name :Business Analytics	Semester :III
L-T-P : 3-0-0	Credit: 3
Pre-Requisites:	

Course Outcomes:

1. Students will demonstrate knowledge of data analytics.
2. Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
3. Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
4. Students will demonstrate the ability to translate data into clear, actionable insights.

SyllabusContents:

Unit1:

Business analytics: Overview of Business analytics, Scope ofBusiness analytics, Business Analytics Process, Relationship ofBusiness Analytics Process and organisation, competitive advantages of Business Analytics.

Statistical Tools: Statistical Notation, Descriptive Statisticalmethods, Review of probability distribution and data modelling,sampling and estimation methods overview.

Unit2:

Trendiness and Regression Analysis: Modelling Relationships andTrends in Data, simple Linear Regression.Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing andExploring Data, Business Analytics Technology

Unit3:

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 MiningMethodologies, Prescriptive analytics and its step in the businessanalytics Process, Prescriptive Modelling, nonlinear Optimization.

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Unit 4:

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carlo Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

Unit 5:

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.

Unit 6:

Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

References:

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

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Subject Code : MCE 302B	Category : Open Elective
Subject Name :Operations Research	Semester :III
L-T-P : 3-0-0	Credit: 3
Pre-Requisites:	

Course Outcomes:

At the end of the course, the student should be able to

1. Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.
2. Students should able to apply the concept of non-linear programming.
3. Students should able to carry out sensitivity analysis.
4. Student should able to model the real world problem and simulate it.

SyllabusContents:

Unit 1:

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

Unit 2

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming.

Unit 3:

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT.

Unit 4

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit 5

Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation.

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References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

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Subject Code : MCE 302 C	Category : Open Elective
Subject Name :Cost Management of Engineering Projects	Semester :III
L-T-P : 3-0-0	Credit: 3
Pre-Requisites:	

Syllabus Contents:

Introduction and Overview of the Strategic Cost Management Process.

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.

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

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.

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

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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.

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Subject Code : MCE 302 D	Category : Open Elective
Subject Name :Industrial Safety	Semester :III
L-T-P : 3-0-0	Credit: 3
Pre-Requisites:	

Syllabus Contents:

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.

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.

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, 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, vi. Electrical motors, Types of faults in machine tools and their general causes.

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,

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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

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

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Subject Code : MCE 302E	Category : Open Elective
Subject Name : Composite Materials	Semester : III
L-T-P : 3-0-0	Credit: 3
Pre-Requisites:	

Syllabus Contents:

UNIT-I: INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II: REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particlereinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT – III: Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT-IV: Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – V: Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first ply failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

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TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, WestGermany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W.Tasi.

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Subject Code : MCE 302F	Category : Open Elective
Subject Name :Waste to Energy	Semester :III
L-T-P : 3-0-0	Credit: 3
Pre-Requisites:	

Syllabus Contents:

Unit-I: Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II: Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III: Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers –Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-IV: Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs,Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design,construction and operation - Operation of all the above biomass combustors.

Unit-V: Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technologyand status - Bio energy system - Design and constructional features - Biomass resources and theirclassification - Biomass conversion processes - Thermo chemical conversion - Direct combustion -biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion -Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production -Urban waste to energy conversion - Biomass energy programme in India

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References:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I &II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

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Subject Code : MCE 381	Category : Major Project
Subject Name :Dissertation –I	Semester :III
L-T-P : 0-0-20	Credit: 10
Pre-Requisites:	

Course Outcomes:

At the end of this course, students will have

- Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
- Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Partial implementation and Verification
- Report and presentation