

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY (AUTONOMOUS)

VISAKHAPATNAM

Course Outcomes of M. Tech (VR-19)

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TRANSPORTATION ENGINEERING

I Year TE Semester-I Course Outcomes:

Pavement Materials and Construction :

- Assess the suitability of aggregates used in various layers of pavement as well as the bitumen used in the wearing course
- Determine the optimum bitumen content by applying the bitumen mix design methods
- understand the sequential stages involved in the construction of flexible and bituminous pavements

Decide the kind of equipment needed for the construction of road and its operation etc

HIGHWAY TRAFFIC ANALYSIS AND DESIGN :

- Develop a basic Knowledge of the fundamental issues in traffic engineering and understanding of the factors influencing road vehicle performance
- Understand Headways and Gap acceptance behavior.
- Define the critical procedures for highway capacity and level of service analysis
- Build knowledge on traffic signal theory and elements of traffic signal Operations design the links and intersections

GROUND IMPROVEMENT TECHNIQUES (Elective I) :

- Apply the principles of ground improvement to a given site condition.
- Prioritize the right technique to improve different difficult grounds.
- Propose the best suitable ground modification technique for different grounds.
- Choose the best admixture for stabilization of ground for different grounds.

Build knowledge on importance and application of Gabion walls and crib walls.

RS & GIS FOR TRANSPORTATION ENGINEERING (Elective I) :

- Interpret various remotely sensed images with the help of acquired knowledge in remote sensing technology
- Apply the GPS instrument in field for various applications
- Make use of the techniques of RS, GIS and GPS techniques in different transportation engineering applications
- Extend knowledge on Intelligent Transportation systems

NUMERICAL METHODS AND APPLIED STATISTICS (Elective I) :

- Apply the different numerical techniques to transportation problems.
- Understand applications of probability theory.
- Use regression and correlation analysis to process transportation data.

INTELLIGENT TRANSPORTATION SYSTEMS (Elective II) :

- Understand the sensor and communication technologies
- Apply the various ITS methodologies
- Define the significance of ITS under Indian conditions

TRANSPORTATION SYSTEM MODELING AND SIMULATION (Elective II) :

- Develop an understanding of the fundamentals of pavement modeling processes
 - Extend knowledge on the Key Relationships and physical laws of models
 - Build knowledge on growth and decay processes
 - Distinguish between virtual and real problems related to various simulation processes
- Select the best simulation language that can be applied in modeling process

BRIDGE ENGINEERING (Elective II) :

- Prepare a detailed project report for the construction of bridge giving hydraulic particulars of the river and soil details and be able to select the suitable site and type of the bridge
- Design various types of bridges like Culvert, Slab Bridge and T-beam Bridge using provisions of IRC
- Design pier, abutment, foundations, bearing and detailing of joints.
- Prioritize the best type of maintenance to be applied to different defects in bridges

HIGHWAY AGGREGATES AND SOIL TESTING LAB :

- Develop knowledge of quality behavior of sub-grade soils.
- Utilize aggregate and bitumen properties in pavement design.

BITUMINOUS TESTING AND PAVEMENT EVALUATION LAB :

- Develop Knowledge on types of bitumen and their quality behavior.
- Utilize aggregate and bitumen properties in pavement design.
- Examine the unevenness of existing pavements.
- Develop Knowledge on mix design of Flexible pavements.

RESEARCH METHODOLOGY AND IPR :

- Identify research problem.
- Able to find solutions for research problem.

SOFT SKILLS :

- **Teamwork** – learning to connect and work with others to achieve a set task.
- **Leadership** – assessing the requirements of a task, identifying the strengths within the team, utilizing the diverse skills of the group to achieve the set objective, awareness of risk/safety.

I Year T.E. Semester-II Course Outcomes:

PAVEMENT ANALYSIS AND DESIGN :

- Know the components of rigid and flexible pavements
- Know the stresses, strains and deflections in rigid and flexible pavements; traffic loading; and material characterization.
- Design methodologies for both rigid and flexible pavements

TRANSPORTATION PLANNING :

- Build knowledge on Factors underlying traveler choices of mode of travel and route choice
- Understand urban activity system and travel patterns
- Know four stage travel demand modelling
- Define the classical methods of urban transportation planning

TRAFFIC FLOW THEORY (Elective III) :

- Analyze the traffic stream parameters.
- Apply the queuing theory.
- Define the significance of ITS under Indian conditions.

PAVEMENT CONSTRUCTION :

- Carryout the construction of flexible pavements
- Understand the construction of interlocking block pavements, quality control test, and construction of various types of joints.
- Understand mix design, construction control and quality control checks of stabilised pavement layers.
- Understand the structural and function failures and evaluation of pavements.
- Develop pavement management systems.

AVIATION INFRASTRUCTURE AND PLANNING (Elective III) :

- Develop a basic knowledge of the fundamental issues in Airport engineering.
- Demonstrate the clear understanding of the airport components.
- Build knowledge on basic principles in airport components geometric design.
- Build knowledge on airport components capacity and delays.
- Build knowledge on critical factors consideration in airport grading and design.
- Develop Knowledge on air traffic control aids.

PORT AND HARBOR ENGINEERING (Elective IV) :

- Develop an understanding of overall Port and Harbor Engineering and its impact.
- Build knowledge on the Key design Characteristics for design of Elements like Groins, Breakwaters
- Perceive with advanced topics like Deck and Fenders, Dolphins etc.
- Extend knowledge on flow regime, lift force mechanism, bed load and suspended load etc.
- Assess the design principles and construction of jetties.
- Build knowledge on design of offshore structures

SUSTAINABLE URBAN AND TRANSPORT DEVELOPMENT (Elective IV) :

- Students would have learnt the importance of sustainable urban and transport planning and its benefits to the human community.

ENVIRONMENTAL IMPACT ASSESSMENT (Elective IV) :

- Able to prepare EIA reports.
- Identify risks and impacts of the projects.
- Selection of an appropriate EIA methodology.
- Evaluation the EIA report.
- Estimate the cost benefit ratio of the project.

TRAFFIC ENGINEERING LABORATORY :

- Build knowledge on quality behavior of road aggregates.
- Develop Knowledge on types of bitumen and their quality behavior.
- Develop knowledge of quality behavior of sub-grade soils.
- Utilize aggregate and bitumen properties in pavement design.
- Examine the unevenness of existing pavements.

TRANSPORTATION SIMULATION LAB :

- Build knowledge on quality behavior of road aggregates
- Develop Knowledge on types of bitumen and their quality behavior
- Develop knowledge of quality behavior of sub-grade soils
- Utilize aggregate and bitumen properties in pavement design
- Examine the unevenness of existing pavements
- Develop Knowledge on mix design of Flexible pavements

II Year T.E. Semester-I Course Outcomes:

Financial and Economic Analysis of Transportation Projects (Elective V) :

- Understand the concepts of decision making.
- Calculate transportation demand and supply.
- Estimate vehicle operating cost and accident cost.
- Perform economic analysis of transportation project.
- Applying various financial methods in road projects.

Highway Safety Engineering (Elective V) :

- Understand causes of accidents, statistical measures of accident data analysis and computer application □□in data analysis.□
- Apply road safety technique in the construction of new roads.□
- Explain road reconstruction principle and improvement of road considering the different components of road and intersections.□
- Explain road safety audit principle and procedure, various traffic management techniques and their effectiveness

COMPUTATIONAL TECHNIQUES IN TRANSPORTATION ENGINEERING (Elective V) :

- A working knowledge of simulation and GPSS programming
- A good understanding of GA applications
- The ability to apply ANN

POWER AND INDUSTRIAL DRIVES

I Year PID Semester-I Course Outcomes:

ELECTRICAL MACHINE MODELING & ANALYSIS :

- Analyze the characteristics of different types of DC motors to design suitable controllers for different applications.
- Apply the knowledge of reference frame theory for AC machines to model the induction and Synchronous machines.
- Evaluate the steady state and transient behavior of induction and synchronous machines to propose the suitability of drives for different industrial applications
- Analyze the behavior of induction machines using voltage and torque equations.

ANALYSIS OF POWER ELECTRONIC CONVERTERS :

- Describe and analyze the operation of AC-DC converters.
- Analyze the operation of power factor correction converters.
- Analyze the operation of three phase inverters with PWM control.
- Study the principles of operation of multi-level inverters and their applications.

MODERN CONTROL THEORY (ELECTIVE-I) :

- Formulate and solve the state equations of dynamic systems, analyze controllability and observability.
- Design a state feedback controller; design an observer.
- Linearize a nonlinear system model; analyze non-linear systems through describing functions.
- Determine the stability of a given system; generate a Lyapunov function.
- Minimize a given functional, design an optimal feedback gain matrix.

POWER QUALITY AND CUSTOM POWER DEVICES (ELECTIVE-I) :

- Identify the issues related to power quality in power systems.
- Address the problems of transient and long duration voltage variations in power systems.
- Analyze the effects of harmonics and study of different mitigation techniques.
- Identify the importance of custom power devices and their applications.
- Acquire knowledge on different compensation techniques to minimize power quality disturbances.

PROGRAMMABLE LOGIC CONTROLLERS & APPLICATIONS (ELECTIVE-I) :

- Understand the PLCs and their I/O modules.
- Develop control algorithms to PLC using ladder logic etc.
- Manage PLC registers for effective utilization in different applications.
- Handle data functions and control of two axis and their axis robots with PLC.
- Design PID controller with PLC.

ARTIFICIAL INTELLIGENCE TECHNIQUES (ELECTIVE-II) :

- Differentiate between Algorithmic based methods and knowledge based methods.
- Use appropriate AI framework for solving power system problems.
- To design fuzzy logic controllers for power engineering applications.

RENEWABLE ENERGY TECHNOLOGIES (ELECTIVE-II) :

- Understand various general aspects of renewable energy systems.
- Analyze and design induction generator for power generation from wind.
- Design MPPT controller for solar power utilization.
- Utilize fuel cell systems for power generation.

HVDC TRANSMISSION AND FLEXIBLE AC TRANSMISSION SYSTEMS (ELECTIVE-II) :

- Compare HVDC and EHVAC transmission systems
- Analyze converter configurations used in HVDC and evaluate the performance metrics.
- Understand controllers for controlling the power flow through a dc link and compute filter Parameters.
- Apply impedance, phase angle and voltage control for real and reactive power flow in ac transmission systems with FACTS controller.
- Analyze and select a suitable FACTS controller for a given power flow condition.

POWER ELECTRONICS SIMULATION LABORATORY :

- To understand the operation of DC-DC converters, AC-DC converters, AC voltage regulators and DC-AC converters by simulation.

POWER CONVERTERS LABORATORY :

- Students are able to implement the converter and inverters in real time applications.

I Year PID Semester-II Course Outcomes:

SWITCHED MODE POWER CONVERSION:

- Analyze operation and control of non-isolated and isolated switch modeconverters.
- Design of non-isolated and isolated switch modeconverters.
- Analyze operation and control of resonantconverters.
- Feedback design of switch mode converters based on linearizedmodels.

POWER ELECTRONIC CONTROL OF ELECTRICAL DRIVES :

- Understand the concepts of scalar and vector control methods for drivesystems.
- Analyze and design controllers and converters for induction motor, PMSM and BLDCdrives.
- Select and implement proper control techniques for induction motor and PMSM for specific applications.
- Analyze and design control techniques and converters for SRMdrives.

CONTROL & INTEGRATION OF RENEWABLE ENERGY SYSTEMS (ELECTIVE -III) :

- Gain knowledge on different renewable energy sources and storedevices
- Recognize, model and simulate different renewable energysources
- Analyze, model and simulate basic control strategies required for gridconnection
- Implement a complete system for standalone/grid connectedsystem

Hybrid Electric Vehicles :

- Know the concept of electric vehicles and hybrid electric vehicles.
- Familiar with different motors used for hybrid electric vehicles.
- Understand the power converters used in hybrid electric vehicles
- Know different batteries and other energy storage systems.

DIGITAL CONTROL SYSTEMS (ELECTIVE-III) :

- Analyze digital control systems using Z-transforms and Inverse Z-Transforms.
- Evaluate the state transition matrix and solve state equation for discrete model for continuous time systems, investigate the controllability and observability.
- Determine the stability; design state feedback controller.
- Design an observer.
- Solve a given optimal control problem.

ADVANCED DIGITAL SIGNAL PROCESSING (ELECTIVE-IV) :

- Describe structure of digital filters.
- Design digital filters with different techniques.
- Understand the implementation aspects of signal processing algorithms.
- Know the effect of finite word length in signal processing.
- Analyze different power spectrum estimation techniques.

APPLICATIONS OF POWER CONVERTERS (ELECTIVE-IV) :

- Analyze power electronic application requirements.
- Identify suitable power converter from the available configurations.
- Develop improved power converters for any stringent application requirements.
- Improve the existing control techniques to suit the application. Design of Bi-directional converters for charge/discharge applications

MICROCONTROLLERS (ELECTIVE-IV) :

- Design the interfacing circuits for input and output to PIC micro controllers and DSP processors.
- Write ALP for DSP processors.
- Design PWM controller for power electronic circuits using FPGA.

ELECTRIC DRIVES SIMULATION LABORATORY :

- The student should analyze the performance of different electrical machines and drives

ELECTRIC DRIVES LABORATORY :

- The student should Understand the performance of DC & AC drives.

Constitution of India (Audit Course-II) :

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secrateriate

II Year PID Semester-I Course Outcomes:

Digital Signal Processor Controlled Drives (Program Elective - V)

- Interface the DSP platform with sensors such as hall-effect voltage sensors,
- Use hall-effect current sensors, shaft encoder for data acquisition for motor drive applications
- Scale and normalize the data to suit the requirements of the drive system
- Exploit the architectural features of the DSP platform to design and implement
- Use algorithms for the realization of controllers, Pulse Width Modulators and observers

Smart Grid Technologies (Program Elective–V) :

- Understand smart grids and analyze the smart grid policies and developments in smart grids.
- Develop concepts of smart grid technologies in hybrid electrical vehicles etc.
- Understand smart substations, feeder automation, GIS etc.
- Analyze micro grids and distributed generation systems.
- Analyze the effect of power quality in smart grid and to understand latest developments in ICT for smart grid.

Modeling and Simulation of Power Electronic Systems (Program Elective–v) :

- Understand the back ground activities i.e. numerical solution used in the simulation software.
- Can judge or properly choose the required numerical solver to be used for analysis.
- Can understand and debug the convergence problems occurring during simulation.

Industrial Safety (Open Elective) :

- Understand the general industrial requirements like lighting, cleanliness prevention from hazards and accidents.
- Analyze maintenance requirements of the industry and cost associated.
- Analyze wear and corrosion aspects of the industry and their prevention.
- Identify the faults prone areas and their repair and periodic maintenance.

Energy Audit Conservation & Management (Open Elective) :

- Understand the principle of energy audit and their economic aspects.
- Recommend energy efficient motors and design good lighting system.
- Understand advantages to improve the power factor.
- Evaluate the depreciation of equipment.

Composite Materials (Open Elective) :

- Understand characteristics and advantages of composite materials
- Acquire knowledge of reinforcement, glass fiber, etc.
- Identify the usage of metal matrix composites
- Understand manufacturing of polymer matrix composites
- Understand manufacturing of polymer matrix composites
- Identify different types of failures.

MACHINE DESIGN

I Year MD Semester-I Course Outcomes:

ADVANCED MECHANICS OF SOLIDS:

- Develop the concept of deformation of bodies.
- Application of elastic deflections.
- Analyze the unsymmetric bending of beams.
- Compose the contact stresses of various cases.

MECHANICAL VIBRATIONS AND ACOUSTICS:

- Contrasts between various terms in acoustics and vibrations.
- Analyze various degrees of systems in vibrations.
- Articulates mode shapes pattern encountered in day to day applications.
- Assess noise control methods by relating to measurement techniques.

PROGRAMME ELECTIVE-I :

DESIGN OF MODERN VEHICLE SYSTEMS:

- Design of Automobile components like structural elements, Load analysis on different vehicles.
- Calculation of the performance of Electric Vehicles, Operation and charging.
- Test for the safety of automobile.
- Evaluate the vehicle performance requirements.

PRODUCT DESIGN:

- Use the Product Design as a means to manage the development of an idea from concept through to production.
- Apply creative process techniques in synthesizing information, problem-solving and critical thinking.
- Systematically conduct quantitative human, cultural and technological research to identify and develop appropriate design strategies.
- Carry out cost and benefit analysis through various cost models.

DESIGNFORMANUFACTURING&ASSEMBLY:

- Given a product design, evaluate and improve the ease of manufacturing and assembly.
- Enhance customer requirements to engineering characteristics, part characteristics, process parameters and production requirements taking into account of economical production.
- To redesign a product for ease of manufacture, assembly, and robustness (insensitive to variations).
- Identify control factors, noise factors, and an appropriate orthogonal array to set up an experiment to establish relation between various design variables and performance requirements.

FRACTUREMECHANICS:

- Correctly apply fracture mechanics to predict brittle fracture. Identify and describe the basic fracture and fatigue mechanisms.
- Analyze factors effecting crack growth and its arrest.
- Derive relationship between fracture design and selection of materials.
- Investigate case studies on fracture mechanics applications.

ADVANCEDMECHANISMS:

- Explain the importance of DOF of joint and mobility criterion.
- Analyzing the mechanism with analytical methods.
- Analyzing the mechanism with Graphical approaches.
- Apply the different manipulators in real time applications.

PROGRAMME ELECTIVE– II :

NON- DESTRUCTIVEEVALUATION:

- Students will be able to understand the basic concepts of different types of Non–Destructive Testing methods.
- Students will be able to explain the working principle of Radiographic testing and Ultrasonic Testing, and use it for industrial needs.
- Students will be able to demonstrate Liquid Penetrant Test, Eddy Current Testing and Magnetic Particle Inspection and Infrared inspections on various samples.
- Differentiate various defect types and select the appropriate NDT methods for better evaluation.
- Students will be able to distinguish different NDT methods and recommend the suitable one for industrial application.

ROBOTICS:

- Identify various robot configuration and components.
- Select appropriate actuators and sensors for a robot based on specific application.
- Carry out kinematic and dynamic analysis for simple serial kinematic chains.
- Perform trajectory planning for a manipulator by avoiding obstacles.

GEOMETRIC MODELING:

- Compare implicit and explicit formulation of curves as well as Formulatethe cubic splines satisfying the necessary conditions.
- Formulate the equations of Bezier curves and B-Splines passing through a set of points.
- Explain the formulations of various surfaces and solve for their equations.
- Explain various concepts of solid modeling.

MULTI BODY DYNAMICS:

- Distinguish between the types of joints and formulate the constraint equations.
- Formulate equations of motion of dynamic equilibrium of a multibody system.
- Compute the kinematics of any point in a given multi-body system.
- Model a spatial multi-body system with different joints and formulate equations of motions.

VISION SYSTEMSANDIMAGEPROCESSING:

- Identify basic concepts, terminology, theories, models and methods in the field of computer Vision.
- Summarizing different feature extraction techniques for image analysis and recognition.
- Implementing the Image Enhancement in the Spatial Domain.
- Predicting the need for image compression and to learn the spatial and frequency domain techniques of image compression.

RESEARCHMETHODOLOGYANDIPR :

- Understand the research problem and research process.
- Understand research ethics.
- Prepare a well-structured research paper and scientific presentations.
- Explore on various IPR components and process of filing.
- Understand the adequate knowledge on patent and rights.

SOFTSKILLS :

- Effectively communicate through verbal/oral communication and improve the listening skills.
- Write precise briefs or reports and technical documents.
- Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
- Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.

I Year MD Semester-II Course Outcomes:

ADVANCEDFINITE ELEMENTMETHODS:

- Generate the governing Finite Element equations for systems governed by differential equations.
- Use the basic finite elements for structural analysis and applications using truss, beam and frame elements.
- Use the Finite Element method for analysis of heat transfer problems.
- Acquire the knowledge of using commercial finite element packages to realistic engineering problems.

ADVANCEDMACHINEDESIGN:

- Design, Formulate, and solve engineering problems.
- Analyze failure of mechanical elements under fatigue, creep and to identify the Economic factors influencing the design.
- Design mechanical components under different loads.
- Develop Logical and Analytical ability to apply Knowledge of various theories of failures for design of Mechanical components.

PROGRAMME ELECTIVE – III :

THEORY OFPLASTICITY:

- Analyse the stresses and strains for two dimensional and three dimensional elements.
- Understand the equilibrium and compatibility conditions.
- Solve the problems on Torsion for different shaped bars.
- Solve problems through Finite element analysis for elastic plastic matrix.

SIGNAL ANALYSISANDCONDITIONMONITORING:

- Apply the concept of various signals.
- Analyze the stepped filter analysis.
- Evaluate the continuous non stationary signals and repeated play back.
- Create the condition monitoring.

COMPUTATIONALFLUID DYNAMICS:

- Express numerical modeling and its role in the field of fluid flow and heat transfer.
- Apply the various discretization methods, solution procedures and turbulence modeling to solve flow and heat transfer problems.
- Interpret the knowledge, capability of analyzing and solving any concept or problem associated with heat energy dynamics and utilization.
- Illustratethe working concepts of thermal engineering.

COMPOSITE MATERIALS:

- On completion of this course, students will be able to understand the concept of composites, can differentiate MMC's, PMS's, CMC's, able to tell the available reinforcing materials and their uses.
- On completion of the topic, students are able to differentiate different types of reinforcement's, matrix materials, and use of coupling agents. Able to explain different nano composites, students are able to explain different fabrication techniques.
- On completion of the topic, students are able to know the use of particular reinforcements to the particular matrix material and able to estimate the properties of a composite by ROM technique.
- On completion of the topic, students are able to know different failure theories and applications of different composite material.

SOFTCOMPUTING:

- Apply various soft computing concepts for practical applications.
- Use fuzzy rules and reasoning to develop decision making and expert system.
- Explain the importance of optimization techniques and genetic programming.
- Review the various hybrid soft computing techniques and apply in real time problems. Choose and design suitable neural network for real time problems.

PROGRAMME ELECTIVE –IV :

EXPERIMENTAL TECHNIQUESAND DATAANALYSIS:

- Analyze the vibration of multi-degrees of freedom systems by modal analysis.
- understanding of the importance of digitalsignal processing of measurements, and its impact on quality of measured data.
- Able to reconstruct mathematical models describing the structure based on experimental modal analysis.
- Able to understand and apply modal analysis in system identification, model updating, and condition monitoring.

DESIGNWITHADVANCEDMATERIALS:

- Explain how the micro-structure and processing route for steels and non-ferrous alloys influence the resulting mechanical properties
- Identify and apply methodologies for the selection of specific materials (steels, stainless steels, polymers and composites) for different applications
- Explain the use of different types of light metal and their alloys with metallurgical aspects.
- Describe properties and applications of smart and Nano materials.

MECHATRONICS:

- Explain basic structure of mechatronics system , identification of different types of drives.
- Understanding and designing mechatronic motion logic control system and the key elements in its design.
- Understanding image fundamentals and how digital images can be processed, Image enhancement techniques and its application.
- Design and Implementation of Micro Mechatronics System.

TRIBOLOGY:

- Understand the fundamentals of tribology and associated parameters.
- Apply concepts of tribology for the performance analysis and design of components experiencing relative motion.
- Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application. Select proper bearing materials and lubricants for a given tribological application.
- Apply the principles of surface engineering for different applications of tribology.

EXPERIEMNTALMODAL ANALYSIS:

- Get familiar with theoretical and practical aspects of structural dynamics and also Develop the ability to plan for experimental testing of structural vibrations.
- Gain the ability to reconstruct mathematical models describing the structure based on experimental modal analysis.
- Gain the ability to fit the various curves.
- Appreciate role of modal analysis in system identification, model updating, and condition monitoring.

Constitution of India (Audit Course):

- Have general knowledge and legal literacy and thereby to take up competitive examinations.
- Understand state and central policies, fundamental duties.
- Understand Electoral Process, special provisions.
- Understand powers and functions of Municipalities, Panchayats and Cooperative Societies

Mini Project with Seminar :

For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee (PRC) consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there **will be only internal evaluation** of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.

Mini project report is evaluated for 100 marks.

- a) Assessment by the supervisor /guide for 30 marks
- b) Assessment by PRC for 40 marks (20 marks x 2 reviews)
- c) Seminar presentations for 30 marks (department level committee assessment)

II Year MD Semester-I Course Outcomes:

PROGRAMME ELECTIVE – V :

INDUSTRIAL ROBOTICS:

- To learn about knowledge for the design of robotics.
- Will understand robot kinematics and motion analysis.
- Will understand end effectors and machine vision.
- Will understand robot kinematics and robot programming.

ADVANCED OPTIMIZATION TECHNIQUES:

- Understand the various concepts on Classical optimization techniques.
- Understand the concepts of Numerical methods for optimization of a problem.
- Apply their knowledge in solving problems related to GA, Multi-objective GA and GP.
- Optimize and synthesis the path, minimize the weight of a component and optimize a machining process parameters.

ADDITIVE MANUFACTURING:

- Select a suitable liquid based Rapid prototyping process based on the application of the product.
- Select solid based Rapid prototyping process based on the application of the product.
- Compare and contrast between the SLS and 3DP rapid prototyping processes.
- Choose a rapid tooling process based on the specific requirement of a component.
- Analyse stl file problems and find solution and repair.

MECHANICS OF COMPOSITE MATERIALS:

- On completion of the topic, students will be able to understand the concept of composites, can differentiate MMC's, PMS's, CMC's, able to tell the available reinforcing materials and their uses.
- On completion of the topic, students able to solve the composites lamina problem for stiffness and compliance matrix, failure theories and know the relationship between stresses and strains.
- On completion of the topic, students can able to apply concept of macro and micro mechanics to analyses laminated composites.
- On completion of the topic, students can design and analyses different composite laminates.

VEHICLE DYNAMICS:

- To learn the detailed study of tyre mechanics.
- To learn the detailed study of dynamic performance characteristics of vehicle.
- To learn the detailed study of handling characteristics of vehicles.
- To learn the detailed study of dynamics of suspension system.

OPEN ELECTIVE:

INDUSTRIAL ROBOTICS:

- To learn about knowledge for the design of robotics.
- Will understand robot kinematics and motion analysis.
- Will understand end effectors and machine vision.
- Will understand robot kinematics and robot programming.

OPERATIONSRESEARCH:

- Be able to understand the application of OR and frame a LP Problem with solution – graphical and simplex method.
- Be able to design and solve simple models of CPM and queuing to improve decision making and develop critical thinking and objective analysis of decision problems.
- Enables to take best course of action out of several alternative courses for the purpose of achieving objectives by applying game theory and sequencing models.
- Learn optimality conditions to solve multi-level decision problems using dynamic programming approach.

COMPUTER SCIENCE AND ENGINEERING

I Year CSE Semester-I Course Outcomes:

Mathematical Foundations of Computer Science :

- To apply the basic rules and theorems of probability theory such as Baye's Theorem, to determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution.
- Able to perform and analyze of sampling, means, proportions, variances and estimates the maximum likelihood based on population parameters.
- To learn how to formulate and test hypotheses about sample means, variances and proportions and to draw conclusions based on the results of statistical tests.
- Design various ciphers using number theory.
- Apply graph theory for real time problems like network routing problem.

Advanced Data Structures & Algorithms :

- Ability to write and analyze algorithms for algorithm correctness and efficiency
- Master a variety of advanced abstract data type (ADT) and data structures and their Implementation
- Demonstrate various searching, sorting and hash techniques and be able to apply and solve problems of real life
- Design and implement variety of data structures including linked lists, binary trees, heaps, graphs and search trees
- Ability to compare various search trees and find solutions for IT related problems

Program Elective-1 :

Artificial Intelligence :

- Identify Methods in AI that may be suited to solving a given problem and Game Playing
- Analyze the basic issues of different types of knowledge representation techniques to build intelligent system
- Build Expert systems for real time applications
- Determination of uncertainty of data using different probability approaches for real time applications

Digital Image Processing :

- Demonstrate the components of image processing
- Explain various filtration techniques.
- Apply image compression techniques.
- Discuss the concepts of wavelet transforms.
- Analyze the concept of morphological image processing.

Advanced Operating Systems :

- Illustrate on the fundamental concepts of distributed operating systems, its architecture and distributed mutual exclusion.
- Analyze on deadlock detection algorithms and agreement protocols.
- Make use of algorithms for implementing DSM and its scheduling.
- Apply protection and security in distributed operating systems.
- Elaborate on concurrency control mechanisms in distributed database systems.

Program Elective-2 :

Advanced Computer Networks :

- Illustrate reference models with layers, protocols and interfaces.
- Describe the routing algorithms, Sub netting and Addressing of IP V4 and IPV6.
- Describe and Analysis of basic protocols of computer networks, and how they can be used to assist in network design and implementation.
- Describe the concepts Wireless LANs, WIMAX, IEEE 802.11, Cellular telephony and Satellite networks
- Describe the emerging trends in networks-MANETS and WSN

Internet of Things :

- Summarize on the term 'internet of things' in different contexts.
- Analyze various protocols for IoT.
- Design a PoC of an IoT system using Raspberry Pi/Arduino
- Apply data analytics and use cloud offerings related to IoT.
- Analyze applications of IoT in real time scenario

Object Oriented Software Engineering :

- Apply the Object Oriented Software-Development Process to design software
- Analyze and Specify software requirements through a SRS documents.
- Design and Plan software solutions to problems using an object-oriented strategy.
- Model the object oriented software systems using Unified Modeling Language (UML)
- Estimate the cost of constructing object oriented software.

Advanced Data Structures & Algorithms Lab :

- Identify classes, objects, members of a class and relationships among them needed for a specific problem.
- Organize and apply to solve the complex problems using advanced data structures (like arrays, stacks, queues, linked lists, graphs and trees.)
- Apply and analyze functions of Dictionary

Advanced Computing Lab :

- The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.
- Development and use of s IoT technology in Societal and Industrial Applications.
- Skills to undertake high quality academic and industrial research in Sensors and IoT.
- To classify Real World IoT Design Constraints, Industrial Automation in IoT.

I Year CSE Semester-II Course Outcomes:

Machine Learning :

- Domain Knowledge for Productive use of Machine Learning and Diversity of Data. Demonstrate on Supervised and Computational Learning
- Analyze on Statistics in learning techniques and Logistic Regression Illustrate on Support Vector Machines and Perceptron Algorithm
- Design a Multilayer Perceptron Networks and classification of decision tree

Big Data Analytics :

- Illustrate on big data and its use cases from selected business domains.
- Interpret and summarize on No SQL, Cassandra
- Analyze the HADOOP and Map Reduce technologies associated with big data analytics and explore on Big Data applications Using Hive.
- Make use of Apache Spark, RDDs etc. to work with datasets.
- Assess real time processing with Spark Streaming.

Advanced Databases and Mining :

- Analyze on normalization techniques.
- Elaborate on concurrency control techniques and query optimization.
- Summarize the concepts of data mining, data warehousing and data preprocessing strategies.
- Apply data mining algorithms.
- Assess various classification & cluster techniques.

Ad Hoc & Sensor Networks :

- Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks
- Discuss the MAC protocol issues of ad hoc networks
- Enumerate the concept of routing protocols for ad hoc wireless networks with respect to TCP design issues
- Analyze & Specify the concepts of network architecture and MAC layer protocol for WSN
- Discuss the WSN routing issues by considering QoS measurements

Soft Computing :

- Elaborate fuzzy logic and reasoning to handle uncertainty in engineering problems.
- Make use of genetic algorithms to combinatorial optimization problems.
- Distinguish artificial intelligence techniques, including search heuristics, knowledge representation, planning and reasoning.
- Formulate and apply the principles of self-adopting and self organizing neuro fuzzy inference systems.
- Evaluate and compare solutions by various soft computing approaches for a given problem

Cloud Computing :

- Interpret the key dimensions of the challenge of Cloud Computing.
- Examine the economics, financial, and technological implications for selecting cloud computing for own organization.
- Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
- Evaluate own organizations' needs for capacity building and training in cloud computing-related IT areas.
- To Illustrate Virtualization for Data-Center Automation.

Principles of Computer Security :

- Describe the key security requirements of confidentiality, integrity, and availability, types of security threats and attacks and summarize the functional requirements for computer security.
- Explain the basic operation of symmetric block encryption algorithms, use of secure hash functions for message authentication, digital signature mechanism.
- Discuss the issues involved and the approaches for user authentication and explain how access control fits into the broader context that includes authentication, authorization, and audit.
- Explain the basic concept of a denial-of-service attack, nature of flooding attacks, distributed denial- of-service attacks and describe how computer security vulnerabilities are a result of poor programming practices.
- List the steps used to secure the base operating system, specific aspects of securing Unix/Linux systems, Windows systems, and security in virtualized systems and describe the security threats and countermeasures for wireless networks.

High Performance Computing :

- Design, formulate, solve and implement high performance versions of standard single threaded algorithms.
- Demonstrate the architectural features in the GPU and MIC hardware accelerators.
- Design programs to extract maximum performance in a multicore, shared memory execution environment processor.
- Analyze Symmetric and Distributed architectures.
- Develop and deploy large scale parallel programs on tightly coupled parallel systems using the message passing paradigm.

Machine Learning with Python Lab :

- Implement procedures for the machine learning algorithms
- Design Python programs for various Learning algorithms
- Apply appropriate data sets to the Machine Learning algorithms
- Identify and apply Machine Learning algorithms to solve real world problems

Big Data Lab :

- Illustrate on Bigdata and its usecases from selected business domains
- Analyse the Hadoop with Java and Map reduce techniques associated with big data analytics and explore on big data applications using HIVE
- Access real time processing with Hadoop.

Constitution of India :

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zillapanchayat block level organisation