# II YEAR
# I SEMESTER

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**DESIGN OF PRESTRESSED CONCRETE STRUCTURES**
**(Professional Elective V)**

**Course Code: GR22D5022** **L/T/P/C: 3/0/0/3**
**II Year I Semester**

**Prerequisite:** Engineering Mechanics, Strength of Materials, Structural Analysis, Concrete Technology, Design of Reinforced Concrete Structures and Design of Steel.

**Course Objectives:**

1. To develop an advanced system of prestressed concrete members.
2. To analyze and design the statically determinate prestressed concrete members.
3. To demonstrate the stresses with anchorage system in prestressed concrete members.
4. To analyze and design the statically indeterminate prestressed concrete members.
5. To analyze and design the composite sections.

**Course Outcomes**:

1. Find out the losses in prestressed concrete and enhance its concepts, which include preand post tensioning processes.
2. Analyze and design the statically determinate prestressed concrete members.
3. Design the end blocks of prestressed concrete members.
4. Analyze and design the statically indeterminate prestressed concrete members.
5. Design the composite structures using prestressed concrete techniques.

**UNIT I**

**Introduction to Prestressed Concrete**: Materials - High strength concrete and High tensile steel - Pre-tensioning and Post tensioning methods – Systems of Prestressing.

**Losses in Prestress:** Losses in Prestress - Analysis of PSC flexural members –Basic concepts-Ultimate strength in flexure –Codal provisions.

**UNIT II**

**Statically Determinate PSC Beams**: Design of flexural members for ultimate and serviceability limit states – Analysis and design for Shear and Torsion - Codal provisions.

**UNIT III**

**Design of End Bocks:** Transmission of prestress in Pre- tensioned members – Anchorage zone stresses for Post-tensioned members.

**UNIT IV**

**Statically Indeterminate Structures**: Analysis and design of continuous beams and frames – Choice of cable profile – Linear transformation and concordancy - Analysis and design of prestressed concrete Pipes and Columns with moments.

**UNIT V**

**Composite Construction:** Analysis and design of composite construction with precast PSC beams and cast in situ RC slabs – Creep and Shrinkage effects – Partial prestressing principles, analysis and design concepts – Crack width calculations.

**Text Books:**

1. Prestressed Concrete by Krishna Raju;Tata Mc.Graw Hill Publications, 6th edition,2018.
2. Prestressed Concrete by Ramamrutham; Dhanpatrai Publications,6th edition,2003.
3. Prestressed Concrete by N. Rajasekharan; Narosa publications.

**Reference Books:**

1. Design of Prestressed concrete structures by T.Y. Lin & Ned H. Burns,John Wiley & Sons, 3rd edition,2010.
2. Codes: IS 1343 - BIS code of practice for Prestressed concrete.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ANALYSIS OF LAMINATED COMPOSITE PLATES**
**(Professional Elective V)**

**Course Code: GR22D5023** **L/T/P/C: 3/0/0/3**
**II Year I Semester**

**Prerequisites:** Advanced Solid Mechanics, Fundamentals of FEM

**Course Objectives:**

1. To analyse the rectangular composite plates using the analytical methods.
2. To develop the governing equations for different boundary conditions.
3. To interpret the analytical Solutions for Bending of Rectangular Laminated Plates Using FSDT.
4. To analyse the composite plates using advanced finite element method.
5. To analysis of Rectangular Composite Plates using Analytical Methods.

**Course Outcomes:**

1. Identify the Displacement Field Approximations for CLPT and FSDT.
2. Analyze the Solutions for Bending of Rectangular Laminated Plates using CLPT.
3. Make use of Finite Element Solutions for Bending of Rectangular Laminated Plates using CLPT.
4. Create Finite Element models.
5. Develop the computer programs for the analysis of composite plates.

**UNIT I**

**Introduction:** Displacement Field Approximations for Classical Laminated Plate Theory (CLPT)and First Order Shear Deformation Theory (FSDT), Analytical Solutions for Bending of Rectangular Laminated Plates using CLPT.

**UNIT II**

**Governing Equations:** Naiver Solutions of Cross-Ply and Angle-Ply Laminated Simply-Supported Plates, Determination of Stresses. Levy Solutions for Plates with Other Boundary Conditions, Analytical Solutions for Bending of Rectangular Laminated Plates using FSDT.

**UNIT III**

**Introduction to Finite Element Method**: Rectangular Elements, Formation of Stiffness Matrix, Formation of Load Vector, Numerical Integration, Post Computation of Stresses.Finite Element Solutions for Bending of Rectangular Laminated Plates using CLPT.

**UNIT IV**

**Finite Element Solutions for Rectangular Laminated Plates**: Finite Element Solutions for Bending of Rectangular Laminated Plates using FSDT. Finite Element Model, C0Element Formulation, Post Computation of Stresses.

**UNIT V**

**Analysis of Rectangular Composite Plates**: Analysis of Rectangular Composite Plates using Analytical Methods.

**Text Books:**


1. Mechanics of Laminated Composites Plates and Shells, Reddy J. N., CRC Press,2nd edition,2003.
2. Theory and analysis of elastic plates and shells. J.N Reddy, CRC Press,2006.
3. Laminated Composites Plates and Shells, Jianqiao, Ye, Springer, London,3rd edition, 2002.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## THEORY OF THIN PLATES AND SHELLS
**(Professional Elective-V)**

**Course Code: GR20D5024** **L/T/P/C: 3/0/0/3**
**II Year I Semester**

**Prerequisites:** Solid Mechanics, Theory of Structural stability

**Course Objectives**
1. Understand the basic relations between equilibrium equations and energy principles.
2. Derive the governing differential equations for thin rectangular plates.
3. Derive the governing differential equations for Circular plates and Orthotropic plates.
4. Derive 2D membrane equation for shells.
5. Understand spherical shells and Hyperboloid of Revolution.

**Course Outcomes**
1. Use analytical methods for the solution of thin long rectangular plates.
2. Use analytical methods for the solution of small deflection theory of rectangular plates.
3. Use analytical methods for the solution of Circular plates and Orthotropic plates.
4. Use analytical methods for the solution of shells.
5. Analyse the Axi- symmetric shells.

**UNIT I**
**Cylindrical Bending:** Different kind of plates – Assumptions - Derivation of differential equation for cylindrical bending of long rectangular plates - Analysis of uniformly loaded rectangular plates with edges simply supported and fixed subjected to uniform load.
**Pure Bending of Plates:** Slope and curvature of slightly bent plates – Relations between moments and curvature - Particular cases of pure bending - Strain energy in pure bending –Energy methods like Ritz and Galerkin Methods to rectangular plates subjected to simple loadings

**UNIT II**
**Small Deflection Theory of Thin Rectangular Plates:** Assumptions-Derivation of governing differential equation for thin plates-Boundary conditions- supported plate under simply sinusoidal load- Navier's solution- Application to cases – Levy's solution for various boundary conditions subjected to different loadings like uniform and hydrostatic pressure.

**UNIT III**
**Circular Plates:** Symmetrical loading – Relations between slope, deflection, moments and curvature – Governing differential equation – Uniformly loaded plates with clamped and simply supported edges – Central hole – bending by moments and shearing forces uniformly distributed.
**Orthotropic Plates:** Introduction – Bending of anisotropic plates - Derivation of governing differential equation – Determination of Rigidities in various cases like R.C. slabs, corrugated sheet – Application to the theory of grid works.

**UNIT IV**

**Analysis of Shells**

Shells – functional behaviour – examples – structural behaviour of shells, classification of shells. Definitions – various methods of analysis of shells – merits and demerits of each method – 2D - Membrane equation. Equations of equilibrium: Derivation of stress resultants – Cylindrical shells Flugge's simulations equations- DKJ Theory.

**UNIT V**

**Shells of Revolution.**

Axi- Symmetrical Shells-Governing general equations. Application to spherical shells and hyperboloid of revolution, cooling towers.

**Text Books:**

1. Timeshanko, Theory of Elasticity, McGrawhill Publications, 3rd edition, 2017.
2. J.Chakarbarthy, Theory of Plasticity, Butterworth Heinemann Publications, 3rd edition,2006.
3. G.S.Ramaswami, Analysis and design of concrete shell roofs,CBS publishers,first edition,2005.

**Reference Books:**

1. Y.C.Fung Theory of Elasticity, Prentice Hall publications, 1965.
2. Billington, Design of concrete shell roofs, 3rd Edition, 1990.
3. N.K.Bairagi, Shell Analysis, Khanna publications, 1990.
4. Dr.N.Krishna Raju, Advanced R.C Design, CBS publishers and distributors Pvt Ltd, 3rd edition, 2016.
5. Chaterjee, Design of concrete shell roofs, Spon press,3rd Edition, 1990.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**COST MANAGEMENT OF ENGINEERING PROJECTS**
**(Open Elective I)**

**Course Code: GR22D5147** **L/T/P/C: 3/0/0/3**
**II Year I Semester**

**Prerequisites:** Estimation & Costing, Construction Technology and Project management.

**Course Objectives:**

1. To attain knowledge in Cost Management process and Costing System.
2. Ability to understand the basic concepts of Project planning, execution, and cost control
3. Discuss about Various types of costs and its behaviour along with Quality Management
4. Identify various types of Budgets involved in Cost Management process
5. Broaden the career potential of available techniques and problems available in Cost Management.

**Course Outcomes:**

1. Discuss various construction costs to manage a construction project.
2. Summarize different construction activities and its application related to cost based on the field requirements.
3. Identify Cost Behaviour of various types of cost and Quality Management
4. Identifying various construction Budgets involved Cost Management process.
5. Discussing various types of Techniques and Problem-solving techniques involved in Construction

**UNIT I**

Introduction and Overview of the Strategic Cost Management Process, Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost, Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

**UNIT II**

**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 non- technical activities; Detailed Engineering activities; Pre project execution main clearances and documents; Project team - Role of each member; Project contracts; Bar charts and Network diagram; Project commissioning - mechanical and process.

**UNIT III**

Cost Behaviour and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis and Cost-Volume-Profit Analysis (theory only). Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. 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 (theory only).

**UNIT IV**

Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets; Measurement of Divisional profitability pricing decisions including transfer pricing.

**UNIT V**

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation and Assignment problems (theory only), Simulation, Learning Curve theory.

**Text Books**


1. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting, Pearson publications,3rd edition,1998.
2. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd, 4th edition,2009.
3. Srikant Datar, Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi, 16th edition, 2017.


**Reference Books**


1. Charles T. Horngren and George Foster, Advanced Management Accounting,prentice Hall,6th edition, 1987.
2. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher,2012.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**INDUSTRIAL SAFETY**
**(OPEN ELECTIVE)**

**Course Code: GR22D5148** **L/T/P/C: 3/0/0/3**
**II Year I Semester**

**Course Objectives:**
1. To understand the importance of maintaining a safe workplace.
2. To maintain safety standards in compliance with regulatory requirements and within engineering limits understand personal safety and industrial safety.
3. To create a job safety analysis (JSA) for a given work project.
4. To follow safety recordkeeping and management, and the role of the safety manager.
5. To utilize personal proactive equipment.

**Course Outcomes:**
1. Understanding of Safety principles.
2. Analyze different types of exposure and biological effects, exposure guidelines and basic workplace monitoring Ability to do Hazard analysis.
3. Demonstrate an understanding of workplace injury prevention, risk management, and incident investigations.
4. Understand the acute and chronic health effects of exposures to chemical, physical and biological agents in the workplace.
5. Demonstrate knowledge of the types of hazards, planning, organization and training needed to work safely with hazardous materials.

**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. Wickfeed lubrication vi. Sidefeed 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, 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.

**TEXT/REFERENCE BOOKS:**


1. Maintenance Engineering Handbook, Higgins & Morrow, Da InformationServices.
2. Maintenance Engineering, H. P. Garg, S. Chand andCompany.
3. Pump-hydraulic Compressors, Audels, McgrewHillPublication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman &HallLondon.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

## OPERATIONS RESEARCH
## (OPEN ELECTIVE)

**Course Code: GR22D5149** **L/T/P/C:3/0/0/3**
**II Year I Semester**

**Course Objectives:**
1. To define and formulate linear and Non-linear programming problems and appreciate their limitations arising from a wide range of applications.
2. To perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change.
3. To distinguish various inventory models and develop proper inventory policies.
4. To solve the scheduling and sequencing models.
5. To understand how to model and solve problems using dynamic programming, Game Theory.

**Course Outcomes:**
1. The student will able to carry out sensitivity analysis.
2. The student will solve network models like the shortest path, minimum spanning tree, and maximum flow problems.
3. The student will able to distinguish various inventory models and develop proper inventory policies.
4. The student will also propose the best strategy using decision making methods under uncertainty and game theory.

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

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

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

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

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

**TEXT/REFERENCE BOOKS:**


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 Optimization: Operations Research, Jain Brothers, Delhi,2008
4. Hitler Libermann Operations Research: McGraw Hill Pub.2009
5. Pannerselvam, Operations Research: Prentice Hall of India2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India2010

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**ARTIFICIAL NEURAL NETWORKS AND FUZZY SYSTEMS**
**(OPEN ELECTIVE)**

**Course Code: GR22D5150** **L/T/P/C: 3/0/0/3**
**II Year I Semester**

**Course Objectives:**
1. To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
2. To know about feedback networks.
3. To learn about the concept of fuzziness involved in various systems
4. To understand the concept of adequate knowledge about fuzzy set theory.
5. To learn about comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm

**Course Outcomes:**
1. To Expose the students to the concepts of feed forward neural networks
2. To provide adequate knowledge about feedback networks.
3. To teach about the concept of fuzziness involved in various systems.
4. To provide adequate knowledge about fuzzy set theory.
5. To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.

**UNIT I**

**Introduction To Neural Networks:**Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

**UNIT II**

**Essentials Of Artificial Neural Networks:**Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

**Feed Forward Neural Networks**

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications

**UNIT III**

**Multilayer Feed Forward Neural Networks**

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

**Associative Memories**

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM StabilityTheorem. Architecture of Hopfield Network: Discrete and

Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

**UNIT IV**

**Self-Organizing Maps (Som) And Adaptive Resonance Theory (Art)**

Introduction, Competitive Learning, Vector Quantization, Self-Organized Learning Networks, Kohonen Networks, Training Algorithms, Linear Vector Quantization, Stability- Plasticity Dilemma, Feed forward competition, Feedback Competition, Instar, Outstar, ART1, ART2, Applications. Classical& Fuzzy Sets Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membershipfunctions.

**UNIT V**

**Fuzzy Logic System Components**

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods. Applications

**Neural network applications:** Process identification, Function Approximation, control and Process Monitoring, fault diagnosis and load forecasting.

**Fuzzy logic applications:** Fuzzy logic control and Fuzzy classification

**TEXT/REFERENCE BOOKS:**


1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHIPublication.
2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House,1997.
3. Neural and Fuzzy Systems: Foundation, Architectures and Applications, - N. YadaiahandS. BapiRaju, PearsonEducation
4. Neural Networks – James A Freeman and Davis Skapura, Pearson,2002.
5. Neural Networks – Simon Hykins , Pearson Education
6. Neural Engineering by C.Eliasmith and CH.Anderson,PHI
7. Neural Networks and Fuzzy Logic System by Bork Kosko, PHIPublications.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**CYBER SECURITY**
**(OPEN ELECTIVE)**

**Course Code: GR22D5151** **L/T/P/C: 3/0/0/3**
**II Year I Semester**

**Course Objectives:**
1. To understand Cyber security challenges and their threats.
2. To understand Cyber attacks and their vulnerabilities.
3. To understand ethical hacking concepts and social engineering targets.
4. To understand cyber forensic investigation process
5. To recognize cyber laws and ethics

**Course Outcomes:**
1. Understand importance and challenges of Cyber security
2. Investigate cybercrime and collect evidences
3. Identify security risks and take preventive steps
4. Able to use knowledge of forensic tools and software
5. Knowledge about Indian IT act and International law

**UNIT I**
**Introduction to Cyber Security:** Introduction to Cyber Security, Importance and challenges in Cyber Security, Cyberspace, Cyber threats, Cyber warfare, CIA Triad, Cyber Terrorism, Cyber Security of Critical Infrastructure, Cyber security - Organizational Implications.

**UNIT II**
**Hackers and Cyber Crimes:** Types of Hackers, Hackers and Crackers, Cyber-Attacks and Vulnerabilities, Malware threats, Sniffing, Gaining Access, Escalating Privileges, Executing Applications, Hiding Files, Covering Tracks, Worms, Trojans, Viruses, Backdoors.

**UNIT III**
**Ethical Hacking and Social Engineering:** Ethical Hacking Concepts and Scopes, Threats and Attack Vectors, Information Assurance, Threat Modelling, Enterprise Information Security Architecture, Vulnerability Assessment and Penetration Testing, Types of Social Engineering, Insider Attack, Preventing Insider Threats, Social Engineering Targets and Defence Strategies.

**UNIT IV**
**Cyber Forensics and Auditing:** Introduction to Cyber Forensics, Computer Equipment and associated storage media, Role of forensics Investigator, Forensics Investigation Process, and Collecting Network based Evidence, Writing Computer Forensics Reports, Auditing, Plan an audit against a set of audit criteria, Information Security Management System Management. Introduction to ISO 27001:2013

**UNIT V**
**Cyber Ethics and Laws:** Introduction to Cyber Laws, E-Commerce and E-Governance, Certifying Authority and Controller, Offences under IT Act, Computer Offences and its penalty under IT Act 2000, Intellectual Property Rights in Cyberspace.

**TEXT/REFERENCE BOOKS:**


1. Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., Enterprise Cybersecurity -How to Build a SuccessfulCyberdefense Program Against Advanced Threats, A-press .
2. Nina Godbole, SumitBelapure, Cyber Security, Willey
3. Hacking the Hacker, Roger Grimes, Wiley
4. Cyber Law By Bare Act, Govt Of india, It Act 2000.

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**INTERNET OF THINGS ARCHITECTURE AND DESIGN PRINCIPLES**
**(OPEN ELECTIVE)**

**Course Code: GR22D5152** **L/T/P/C: 3/0/0/3**
**II Year I Semester**

**Course Objectives:**
1. To assess the vision and introduction of IoT.
2. To Understand Networking & Communication aspects of IOT.
3. To Explore the Application areas of IOT and to analyze the current needs
4. To Understand State of the Art - IoT Architecture.
5. To classify Real World IoT Design Constraints, Industrial Automation in IoT.

**Course Outcomes:**
1. Understand the concepts of Internet of Things
2. Analyze basic protocols in wireless sensor network
3. Design IoT applications in different domain and be able to analyze their performance
4. Understand the Hardware concepts of Internet of Things
5. Implement basic IoT applications through python.

**UNIT-I**
**Introduction to IoT** : Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs**IoT & M2M** Machine to Machine, Difference between IoT and M2M, Software define Network.

**UNIT-II**
**Network & Communication aspects** Connectivity terminologies-IOT Node, LAN,WAN, Gateway, IOT Stack vs. Web Stack, IOT Identification and Data Protocols-IPV4,IPV6,HTTP,MQTT,COAP

**UNIT-III**
**IOT Applications** Smart Homes-Smart Home Origin, Technologies, Implementation, Smart Grids-Characteristics, Benefits, Architecture, Components, Smart Cities-Characteristics, Frameworks, Challenges, Industrial IOT- Requirements, Design Considerations, Applications

**UNIT-IV**
**Hardware Platforms** Programming with Arduino-Features of Arduino, Components of Arduino Board, Arduino IDE, Program Elements, Raspberry

**UNIT-V**
**Developing IoTs** Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor based application through embedded system platform, Implementing IoT concepts with python.

**Text Books:**

**1.** Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”
**2.** Internet of Things, Jeeva Jose, Khanna Publishing, 2018
**3.** Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice".

**Reference Books:**

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1 st Edition, Academic Press, 2014. (ISBN-13: 978-0124076846).
2. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”,1st st Edition, Apress Publications, 2013. (ISBN-13: 978- 1430257.
3. Internet of Things Challenges, Advances and Applications by Quas F.Hassan, Atta Ur Rehaman Khan, and Sajiad A. Madani