# Vision of the Institution

To ignite the minds of the students through academic excellence so as to bring about social transformation and prosperity.

# Mission of the Institution

- To expand the frontiers of knowledge through Quality Education.
- To provide valued added Research and Development.
- To embody a spirit of excellence in Teaching, Creativity, Scholarship and Outreach.
- To provide a platform for synergy of Academy, Industry and Community.
- To inculcate high standards of Ethical and Professional Behavior.

# Vision of IT Department

To be leaders in Information Technology through excellence in education, research and community outreach.

# Mission of IT Department

- To provide quality education in the core principles of Information Technology.
- To enable the students to apply the core concepts to solve real world problems.
- To amplify their potential through research and continuous learning for high quality career.
- To mould them as professionals with ethics and morals.

# Program Educational Objectives(PEOs)

**PEO1**: To provide students with a strong foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering problems.

**PEO2**: Graduates will succeed in entry-level engineering positions in IT industry and with government agencies.

**PEO3**: Graduates will succeed in the pursuit of advanced degrees in engineering or other fields and will have skills for, continued independent, lifelong learning to become experts in their profession.

**PEO4**: Empower students with effective teamwork, communication skills, leadership skills, ethical values and high integrity to serve the interests of the society and nation.

# Program Outcomes(POs) of IT Department

**Engineering Graduates will be able to:**

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## Program Specific Outcomes (PSOs) of IT Department

1. An ability to demonstrate basic knowledge in databases, programming languages, common business functions and algorithm analysis to design and develop appropriate Information Technology solutions.
2. Ability to organize an IT Infrastructure, manage and monitor resources and secure the data.

# ARTIFICIAL NEURAL NETWORKS

**OBJECTIVES:**
- Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.
- Provide knowledge of supervised learning in neural networks
- Provide knowledge of computation and dynamical systems using neural networks
- Provide knowledge of reinforcement learning using neural networks.
- Provide knowledge of unsupervised learning using neural networks.
- Provide hands-on experience in selected applications

## UNIT-I: Introduction and ANN Structure.
Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

## UNIT-II
Mathematical Foundations and Learning mechanisms.Re-visiting vector and matrix algebra. State-space concepts. Concepts of optimization. Error-correction learning. Memory-based learning. Hebbian learning. Competitive learning.

## UNIT-III
Single layer perceptrons. Structure and learning of perceptrons. Pattern classifier - introduction and Bayes' classifiers. Perceptron as a pattern classifier. Perceptron convergence. Limitations of a perceptrons.

## UNIT-IV: Feed forward ANN.
Structures of Multi-layer feed forward networks. Back propagation algorithm. Back propagation - training and convergence. Functional approximation with back propagation. Practical and design issues of back propagation learning.

## UNIT-V: Radial Basis Function Networks.
Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks.RBF network design and training. Approximation properties of RBF.

## UNIT-VI:  Support Vector machines.
Linear separability and optimal hyperplane.Determination of optimal hyperplane. Optimal hyperplane for nonseparable patterns. Design of a SVM.Examples of SVM.

**OUTCOMES:**

- This course has been designed to offer as a graduate-level/ final year undergraduate level elective subject to the students of any branch of engineering/ science, having basic foundations of matrix algebra, calculus and preferably (not essential) with a basic knowledge of optimization.
- Students and researchers desirous of working on pattern recognition and classification, regression and interpolation from sparse observations; control and optimization are expected to find this course useful. The course covers theories and usage of artificial neural networks (ANN) for problems pertaining to classification (supervised/ unsupervised) and regression.
- The course starts with some mathematical foundations and the structures of artificial neurons, which mimics biological neurons in a grossly scaled down version. It offers mathematical basis of learning mechanisms through ANN. The course introduces perceptrons, discusses its capabilities and limitations as a pattern classifier and later develops concepts of multilayer perceptrons with back propagation learning.

**TEXT BOOKS:**

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.

**REFERENCE BOOKS:**

1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

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# CONCURRENT AND PARALLEL PROGRAMMING
## (Elective - III)

**OBJECTIVES:**
- Improvement of students comprehension of CPP, new programming concepts, paradigms and idioms
- Change of 'mood' regarding Concurrency counter-intuitiveness
- Proactive attitude: theoretical teaching shouldn't be so dull
- Multipath, individually paced, stop–and–replay, personalized learning process
- Frequent assessment of learning advances on the subject

**UNIT- 1**
Concurrent versus sequential programming. Concurrent programming constructs and race condition. Synchronization primitives.

**UNIT-II**
Processes and threads. Interprocess communication. Livelock and deadlocks, starvation, and deadlock prevention. Issues and challenges in concurrent programming paradigm and current trends.

**UNIT-III**
Parallel algorithms – sorting, ranking, searching, traversals, prefix sum etc.,

**UNIT- IV**
Parallel programming paradigms – Data parallel, Task parallel, Shared memory and message passing, Parallel Architectures, GPGPU, pthreads, STM,

**UNIT-V**
OpenMP, OpenCL, Cilk++, Intel TBB, CUDA

**UNIT-VI**
Heterogeneous Computing: C++AMP, OpenCL

**OUTCOMES:**

- Understanding improvement of CPP concepts presented
- The number of reinforcement–exercises assigned
- The time required for the resolution of exercises
- Compliance level with the new model of theoretical teaching

**TEXT BOOKS:**

1. Mordechai Ben-Ari. Principles of Concurrent and Distributed Programming, Prentice-Hall international.
2. Greg Andrews. Concurrent Programming: Principles and Practice, Addison Wesley.
3. GadiTaubenfeld. Synchronization Algorithms and Concurrent Programming, Pearson.

**REFERENCES:**

1. M. Ben-Ari. Principles of Concurrent Programming, Prentice Hall.
2. Fred B. Schneider. On Concurrent Programming, Springer.
3. Brinch Hansen. The Origins of Concurrent Programming: From Semaphor

# CYBER SECURITY

**OBJECTIVES:**
- The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

**UNIT- I: Introduction to Cybercrime:**
Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security ,Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

**UNIT -II: Cyber offenses:**
How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

**UNIT -III: Cybercrime Mobile and Wireless Devices:**
Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

**UNIT -IV: Tools and Methods Used in Cybercrime:**
Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft)

**UNIT -V: Cybercrimes and Cyber security:**
Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

**UNIT -VI: Understanding Computer Forensics:**

Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Ant forensics

**OUTCOMES:**
- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Describing risk management processes and practices
- Evaluation of decision making outcomes of Cyber Security scenarios

**TEXT BOOKS:**

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, Sunit Belapure, Wiley.
2. Principles of Information Security, Micheal E.Whitman and Herbert J.Mattord, Cengage Learning.

**REFERENCES:**

1. Information Security, Mark Rhodes, Ousley, MGH.

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## MANAGEMENT INFORMATION SYSTEMS

**OBJECTIVES:**

- MIS is very useful for efficient and effective planning and control functions of the management. Management is the art of getting things done through others. MIS will be instrumental in getting the things done by providing quick and timely information to the management.

- MIS is helpful in controlling costs by giving information about idle time, labour turnover, wastages and losses and surplus capacity.

- By making comparison of actual performance with the standard and budgeted performance, variances are brought to the notice of the management by MIS which can be corrected by taking remedial steps.

**UNIT - I:**

**Information System And Organization**

Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development – User role in Systems Development Process – Maintainability and Recoverability in System Design.

**UNIT - II:**

**Representation And Analysis Of System Structure**

Models for Representing Systems: Mathematical, Graphical and Hierarchical organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics – Decomposition and Aggregation – Information Architecture – Application of System Representation to Case Studies.

**UNIT - III:**

**Systems, Information and Decision Theory**

Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty.

**UNIT- IV:**

Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making.

**UNIT – V:**

**Information System Application**

Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning – Other use of Information Technology: Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism.

**UNIT – VI:**

**Development And Maintenance Of Information Systems**

Systems analysis and design – System development life cycle – Limitation – End  user Development – Managing End Users – off– the shelf software packages – Outsourcing – Comparison of different methodologies.

**OUTCOMES:**
- MIS brings to the notice of the management strength (i.e., strong points) of the organization, to take advantage of the opportunities available.

- MIS reports on production statistics regarding rejection, defective and spoilage and their effect on costs and quality of the products.

**TEXT BOOK:**

1.  Laudon K.C, Laudon J.P, Brabston M.E, "Management Information Systems - Managing the digital firm", Pearson Education, 2004.

**REFERENCES:**

1. Turban E.F, Potter R.E, "Introduction to Information Technology"; Wiley, 2 004.

2. Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, "Modern Systems Analys and Design", Third Edition, Prentice Hall, 2002.

## MANAGEMENT SCIENCE

**Course Objectives:**
**\*To familiarize with the process of management and to provide basic insight into select contemporary management practices**
**\*To provide conceptual knowledge on functional management and strategic management.**

**UNIT I**
**Introduction to Management**: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

**UNIT II**
**Operations Management**: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

**UNIT III**
**Functional Management**: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

**UNIT IV**
**Project Management**: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

**Unit V**
**Strategic Management**: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies.

**UNIT VI**
**Contemporary Management Practice**: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO),  Business process Re-engineering and Bench Marking, Balanced Score Card.

**Course Outcome:**
**\*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.**
**\*Will familiarize with the concepts of functional management project management and strategic management.**


**Text Books**
1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science'* Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, *Management Science'* TMH 2011.

**References:**

1. Koontz & Weihrich: 'Essentials *of management'* TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. Kanishka Bedi: Production & Operations Management, Oxford    Publications, 2011
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
6. Biswajit Patnaik: Human Resource Management, PHI, 2011
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.)    Delhi 2015.
9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

# SOFTWARE QUALITY ASSURANCE

**OBJECTIVES:**
- Describe approaches to quality assurance
- Understand quality models
- Evaluate the system based on the chosen quality model

**Unit I: Introduction:**
The Software Quality Challenge. What is Software Quality?
Software Quality Factors: The Components of the Software Quality Assurance System -
Overview **Pre-Project Software Quality Components**

**Unit II:**
**SQA Components in the Project Life Cycle**
Integrating Quality Activities in the Project Life Cycle, ReviewsSoftware Testing - Strategies
Software Testing –Implementation, Assuring the Quality of Software Maintenance

**Unit III: Software Quality Infrastructure Components**
Procedures and Work Instructions. Supporting Quality Devices Staff Training, Instructing and
Certification. Preventive and Corrective Actions.

**Unit IV: Software Quality Management Components**
Project Progress Control: Software Quality Metrics, Software Quality Costs

**Unit V: Standards, Certification and Assessment**
SQA StandardsISO 9001 Certification Software, Process Assessment

**Unit VI: Organizing for Quality Assurance**
Management and its Role in Quality Assurance, The Software Quality Assurance

**OUTCOMES:**
Upon Completion of the course, the students will be able to
- Describe different approaches to testing software applications
- Analyze specifications and identify appropriate test generation strategies
- Develop an appropriate test design for a given test object

**TEXT BOOKS:**

1. Software Quality Assurance, Theory of implementation-Daniel Galin, Pearson
2. MauroPezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008

**REFERENCE BOOKS:**
1. BorizBeizer, "Software Testing Techniques", 2nd Edition, DreamTech, 2009.
2. Aditya P. Mathur, "Foundations of Software Testing", Pearson, 2008
3. Mauro Pezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008
4. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", 2nd Edition, Pearson, 2003
5. KshirasagarNaik and PriyadarshiTripathy (Eds), "Software Testing and Quality Assurance: Theory and Practice", John Wiley, 2008