SAMRAT ASHOK TECHNOLOGICAL INSTITUTE

(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

DEPARTMENT OF IT

Semester/ Year		VII/ IV		Program		B. Tech – IT				
Subject Category	DC	Subject Code:		IT 701	Subject Name	Software Testing and Quality				
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10				100	3	0	0	3

Prerequisites:

Basic knowledge of programming skills and data structures.

Course Objective:

1. To introduce Software testing principles.
2. To introduce knowledge of testing techniques and levels of testing.
3. To understand Automation and Quality Metrics.
4. To Quality Assurance tools and Models.
5. To introduce Quality Assurance trends.

UNITs	Descriptions	Hrs.
I	Testing as an engineering activity, Role of process in software quality, Testing as a process, Basic definitions, Software testing principles, The tester's role in a software development organization, Origins of defects, Defect classes, The defect repository and test design, Defect examples, Developer / Tester support for developing a defect repository.	8
II	Testing techniques and levels of testing: Using White Box Approach to Test design - Static Testing Vs. Structural Testing, Code Functional Testing, Coverage and Control Flow Graphs, Using Black Box Approaches to Test Case Design, Random Testing, Requirements based testing, Decision tables, State-based testing, Cause-effect graphing, Error guessing, Compatibility testing, Levels of Testing -Unit Testing, Integration Testing, Defect Bash Elimination. System Testing - Usability and Accessibility Testing, Configuration Testing, Compatibility Testing.	8
III	Automation and Quality Metrics Software Test Automation, Skills needed for Automation, Scope of Automation, Design and Architecture for Automation, Requirements for a Test Tool, Challenges in Automation Tracking the Bug, Debugging. Testing Software System Security - Six-Sigma, TQM - Complexity Metrics and Models, Quality Management Metrics, Availability Metrics, Defect Removal Effectiveness, FMEA, Quality Function Deployment, Taguchi Quality Loss Function, Cost of Quality.	8
IV	Quality Assurance tools and Models SQA basics, Components of the Software Quality Assurance System, software quality in business context, planning for software quality assurance, product quality and process quality, software process models, 7 QC Tools and Modern Tools. Models for Quality Assurance, ISO-9000 series, CMM, CMMI, Test Maturity Models, SPICE, Malcolm Baldrige Model- PCMM.	8
V	Quality Assurance trends; Software Process- PSP and TSP, OO Methodology, Clean-room software engineering, Defect Injection and prevention, Internal Auditing and Assessments, Inspections &	8

	Walkthroughs, Case Tools and their Affect on Software Quality.	
Total Hours		40

Course Outcomes:

CO1. Test the software by applying testing techniques to deliver a product free from bugs.
CO2. Investigate the scenario and to select the proper testing technique.
CO3. Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.
CO4. Understand how to detect, classify, prevent and remove defects.
CO5. Choose appropriate quality assurance models and develop quality.

Text Book & Reference Books-

1. Srinivasan Desikan, Gopalaswamy Ramesh, Software Testing: Principles and Practices Pearson.
2. Daniel Galin, Software Quality Assurance: From Theory to Implementation, Pearson Addison Wesley.
3. Aditya P. Mathur, Foundations of Software Testing, Pearson.
4. Paul Ammann, Jeff Offutt, Introduction to Software Testing, Cambridge University Press.
5. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, Auerbach Publications.

List/Links of e-learning resource

- https://archive.nptel.ac.in

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO11	PO12	PSO1	PSO2
CO-1		2			2							2	1	2
CO-2	2	3		2	1						1	2	3	3
CO-3	2	3	3	2								2	2	2
CO-4	2	2		2								2	3	3
CO-5	2	2	2									2	3	3

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE

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DEPARTMENT OF IT

Semester/Year		VII/IV		Program		B. Tech – IT				
Subject Category	DE-4	Subject Code:		IT 702 (A)	Subject Category	Distributed System				
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks Quiz				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Prerequisites:

1. Basic knowledge of "Operating Systems" and "Computer Organization & Architecture"

Course Objective:

1. This course provides an insight into Distributed systems.
2. Topics include- Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory.

UNITs	Descriptions	Hrs.
I	Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models -Introduction, Architectural and Fundamental models, Networking and Internetworking, Inter process Communication, Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.	8
II	Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture.	8
III	Peer to Peer Systems–Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, Ocean Store. Time and Global States- Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging. Coordination and Agreement- Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.	8
IV	Transactions and Concurrency Control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering. Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.	8
V	Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data. Distributed shared memory, Design and Implementation issues, Consistency models.	8
Total Hours		40

22/12/25

Course Outcomes:

CO1: Ability to understand Transactions and Concurrency control.
CO2: Ability to understand Security issues.
CO3: Understanding Distributed shared memory.
CO4: Ability to design distributed systems for basic level applications.

Text Book & Reference Books-

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S Ghosh, Chapman & Hall/CRC, Taylor & Francis Group, 2010.
3. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
4. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

List/Links of e-learning resource

- https://archive.nptel.ac.in

Modes of Evaluation and Rubric

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CO-PO Mapping:

COs	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_1	PO_{11}	PO_{12}	PSO1	PSO2
CO-1	3	3	2	3	1							2	3	
CO-2		3	3	2	3									
CO-3	2	3	3	3	2									
CO-4		2	3	3										

Suggestive list of experiments:

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

23/12/25

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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Semester/Year		VII/IV	Program		B. Tech – IT
Subject Category	DE- 4	Subject Code:	IT 702 (B)	Subject Name	Internet Technology

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Knowledge of Computer Networks and Computer Programming.

Course Objective:

A) To develop an understanding of the technological foundations of the Internet and core Internet protocols (TCP/IP, SMTP, FTP, Telnet, ICMP, RSS, and HTTP);
B) To understand client/server relationships in the context of the Internet and intranets;
C) To identify important Internet content and graphics formats and understand the access issues they present users and the software they require;
D) To develop a framework for evaluating web resources and designs;

UNITs	Descriptions	Hrs.
I	History and scope of The Internet, Principles of internetworking, Connecting devices- Repeaters, Bridges, Routers, Gateways. IP Addressing- Classful IP addressing and Classless IP Addressing, Concept of sub netting & super netting. Special addresses.	8
II	**Network Layer Protocols-** Forwarding Techniques for an IP Packet, Packet format of IP Protocol, ARP, RARP, Proxy ARP, Brief explanation of Internet Control Message Protocol (ICMP) and Internet Group Management Protocol (IGMP).	8
III	**Transport Layer Protocols-** Concept of Process-To-Process Communication, Brief explanation of User Datagram Protocol (UDP) & Transmission Control Protocol (TCP), Connection Establishment & Connection Termination in TCP, Sliding Window Protocol, Congestion control in TCP, TCP Timers, SCTP.	8
IV	**Routing Protocols-** INTRA and INTER Domain Routing, Distance Vector Routing, Link State Routing, Path Vector Routing, RIP, OSPF, BGP, Multicasting- Multicast Link State Routing, Multicast Distance Vector Routing.	8
V	**Upper Layer Protocols-** Domain Name System (DNS), BOOTP, DHCP, TELNET, FTP, TFTP, SMTP, SNMP Mobile IP, Fault management, Fault management functions	8
Total Hours		40

Course Outcomes:

The students would be able to-
CO-1: Develop a fundamental understanding of principles of Internetworking and characteristics of connecting Devices and IP addressing.
CO-2: Describe the Network layer protocol such as IP, ARP, RARP, ICMP and IGMP.
CO-3: Explain the role of transport layer, and analyze the role and services of transport layer protocol such as TCP and UDP.
CO-4: Distinguish between various routing techniques such as distance vector and link state routing techniques.
CO-5: Examine working of upper layer protocol.

Text Book & Reference Books-

1. TCP/IP Protocol Suite by Behrouz A. Forouzan.
2. Internetworking with TCP/IP By Douglas E. Comer.
3. Computer Networks by Andrew S. Tanenbaum

List/Links of e-learning resource

- https://archive.nptel.ac.in

Modes of Evaluation and Rubric

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CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO11	PO12	PSO1	PSO2
CO-1	3	2	2										3	
CO-2	3	3	2		1		1			2		2	2	2
CO-3	3	2	1		2		2			2		3	2	2
CO-4	3	3	2	2	2	2	2			2		2	2	3
CO-5	3	3							1	1		1	2	

Suggestive list of experiments:

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE

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DEPARTMENT OF IT

Semester/Year		VII/IV		Program		B. Tech – IT					
Subject Category	DE-4	Subject Code:		IT 702 (C)	Subject Name	Computer Vision					
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Prerequisites:

Basic Knowledge of algorithms, Discrete Mathematics

Course Objective:

1 Understand the computer imaging systems.
2. Understand the Pattern Analysis.
3. Understand the Classifiers.

UNITs	Descriptions	Hrs.
I	Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis.	8
II	Edge detection, Edge detection performance, Hough transform, corner detection Segmentation, Morphological filtering, Fourier transform.	8
III	Feature extraction, shape, histogram, color, spectral, texture, using CV IP tools, Feature analysis, feature vectors, distance /similarity measures, data pre-processing.	8
IV	Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians Classification: Discriminant Function, Supervised, Unsupervised, Semi-supervised.	8
V	Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods. Recent trends in Activity Recognition, computational photography, Biometrics.	8
Total Hours		40

Course Outcomes:

CO1: Identify basic concepts, terminology, theories, models and methods of computer vision.
CO2: Describe basic methods of computer vision related to multi-scale representation.
CO3: Understanding edge detection of primitives, stereo, motion and object recognition.
CO4: Developed the practical skills necessary to build computer vision applications.
CO5:To have gained exposure to object and scene recognition.

Text Book & Reference Books-

1. "Human Computer Interaction" by Alan Dix, Janet Finlay, ISBN :9788131717035, Pearson Education (2004).
2. "Designing the User Interface - Strategies for Effective Human Computer Interaction", by Ben Shneiderman ISBN: 9788131732557, Pearson Education (2010).
3. Usability Engineering: Scenario-Based Development of Human-Computer Interaction,

by Rosson, M. and Carroll, J. (2002).
4. The Essentials of Interaction Design, by Cooper, et al., Wiley Publishing (2007).
5. The Resonant Interface: HCI Foundations for Interaction Design, by Heim, S., Addison Wesley. (2007)

List/Links of e-learning resource

- https://archive.nptel.ac.in

Modes of Evaluation and Rubric

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CO-PO Mapping:

COs	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_1	PO_{11}	PO_{12}	PSO1	PSO2
CO-1	3	3	2	3	1							2	3	1
CO-2		2	3	2	3									
CO-3	2	1	2	3	2								1	
CO-4		2	3	2								1		2
CO-5	2		2		2				1				1	

Suggestive list of experiments:

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE

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DEPARTMENT OF IT

Semester/Year		VII/IV		Program		B.Tech -IT					
Subject Category	DE-5	Subject Code:		IT 703 (A)	Subject Name	Information and Storage Retrieval					
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	4

Prerequisites:

Basic knowledge of DBMS

Course Objective:

1. To understand the concept of indexing.
2. To get acquainted with different types of vocabulary control devices.
3. To get an insight into the provisions in a thesaurus and methodology of its constructions with reference application of computers.
4. To recognize different tools and techniques associated with the artificial intelligences based subject indexing systems.
5. To explore the strengths and weaknesses of different indexing techniques

UNITs	Descriptions	Hrs.
I	Cataloguing & Subject Indexing: Principles of Subject Cataloguing: Assigning Subject Heading Using Library of Congress Subject Heading & Sears List of Subject Heading Etc. Pre-& Post Co-Ordinate Indexing & Citation Indexing	8
II	Indexing Languages & Vocabulary Control: Indexing Languages: Types & Characteristics Vocabulary Control: Tools of Vocabulary Control Structure & Construction of an IR Thesaurus, Design and Development of IR Thesaurus Trends In Indexing Assigned Indexing Practice Derived Indexing Practice Formulation of Search Strategy Search Engines Federated Search Aggregators Subject Gateways	8
III	Information Retrieval: IR Models, Basic Models, Models Based on Theory, Tools and Recent Models; Search Strategies: Evaluation of Information Retrieval Systems; Trends in IR Models	8
IV	New Trends: Semantic Web, OWL (Ontology Web Language), Data Storage and Data Management – Features and contribution of AI (ML + DL), IoT in Intelligent Data Management.	8
V	Abstract & Abstracting: Concept, Purpose & Its Usefulness: Characteristics of Good Abstract Types Abstracting Procedure Standards & Guidelines for Preparing Abstract Automatic Abstracting	8
Total Hours		40

Course Outcomes:

CO1: Acquire knowledge on concepts and terminologies in Information Processing and Retrieval Theory.

CO2: Understand and apply various Indexing systems and Bibliographic Description

Standards.

CO3: Apply search strategies to locate and retrieve required information.

CO4: Differentiate the past, present and current practice of Information and Data Storage and Retrieval tools and techniques.

CO5: Understand the marketable value of information products and services.

CO6: Applies the principles, approaches and methods of marketing in the Library Environment.

Text Book & Reference Books-

1. Foskett (AC). The Subject Approach to Information. 4th Ed. London: Bingley, 1982.
2.Chowdhary (GG). Introduction to Modern Information Retrieval. 2nd Ed. London: Facet Publishing, 2003. Gopinath (MA). Construction of Depth Version of Classification: A Manual. New Delhi. Wiley Eastern Limited, 1986.
3.Gorman (GE) Ed. Meta Data Application for Management, London, Facet Publishing, 2003.
4.Harter (Stephen P.). Online Information Retrieval: Concept, Principles and Techniques, Orlando, Academic Press, 1978.
5.Hepas (ITS). Information Retrieval: Computational and Theoretical Aspects. New York, Academic Press. 1978.

List/Links of e-learning resource

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Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_1	PO_{11}	PO_{12}	PSO1	PSO2
CO-1	3	3	2	3	1							2	3	
CO-2		3	3	2	3									
CO-3	2	3	3	3	2							2	2	2
CO-4		2	3	3								3	3	3
CO-5		3	2	3								3	3	3
CO-6														

Suggestive list of experiments:

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

23/12/25

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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DEPARTMENT OF IT

Semester/Year		VII/IV		Program		B. Tech – IT				
Subject Category	DE-5	Subject Code:		IT 703 (B)	Subject Name	Optimization Technique				
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Prerequisites:

Knowledge of Computer Programming Language and data structures.

Course Objective:

A) The focus of the course is on convex optimization though some techniques will be covered for non-convex function optimization too.
B) After an adequate introduction to linear algebra and probability theory, students will learn to frame engineering minima maxima problems in the framework of optimization problems.

UNITs	Descriptions	Hrs.
I	Mathematical preliminaries Linear algebra and matrices. Vector space, Eigen analysis. Elements of probability theory. Elementary multivariable calculus.	8
II	Linear Programming Simplex method, Introduction to linear programming model, Duality, Karmarkar's method.	8
III	Unconstrained optimization Conjugate direction and quasi-Newton methods, Gradient-based methods, One-dimensional search methods	8
IV	Constrained Optimization Lagrange theorem. FONC, SONC, and SOSC conditions.	8
V	Projection methods, KKT conditions, Non-linear constrained optimization models Nonlinear problems.	8
Total Hours		40

Course Outcomes:

CO-1: To implement optimization algorithms and model engineering minima/maxima problems as optimization problems.
CO-2: To understand the theory of optimization methods and algorithms developed for solving various types of optimization problem.
CO-3: To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.
CO-4: To study equality constraint.
CO-5: Explain the fundamental knowledge of Non-linear constrained optimization.

Text Book & Reference Books-

1. An introduction to Optimization by Edwin P K Chong, Stainslaw Zak.
2. Nonlinear Programming by Dimitri Bertsekas

List/Links of e-learning resource

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Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

28/12/22

CO-3	2	1	2	3	2								1		
CO-4		2	3	2								1		2	
CO-5	2		2		2				1				1		

Suggestive list of experiments:	
Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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DEPARTMENT OF IT

Semester/Year	VI/III	Program	B.Tech–IT
Subject Category: DE-5	Subject Code:	IT703(C)	Subject Name: Pattern Recognition

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Prerequisites:

Knowledge of Management Information System.

Course Objective:

A) To provide classifiers based on Bayes Decision Theory
B) To focus on linear and non-linear classifiers
C) To enhance skills of feature engineering

UNITs	Descriptions	Hrs.
I	Classifiers Based on Bayes Decision Theory: Introduction, Bayes Decision Theory, Discriminant Functions and Decision Surfaces, Bayesian Classification, Maximum Likelihood Parameter Estimation, Maximum a Posteriori Probability Estimation, Bayesian Inference, Maximum Entropy Estimation, Mixture Models, Nonparametric Estimation, The Naive Bayes Classifier, The Nearest Neighbor Rule, Bayesian Networks.	8
II	Linear Classifiers: Linear Discriminant Functions and Decision Hyperplanes, The Perceptron Algorithm, Least Squares Methods, Mean Square Estimation Revisited: Logistic Discrimination, Support Vector Machines.	8
III	Non-Linear Classifiers: XOR Problem, Two-Layer and Three-Layer Perceptrons, Backpropagation Algorithm, Hyperparameters, Generalized Linear Classifiers, Capacity of the l-Dimensional Space in Linear Dichotomies, Polynomial Classifiers, Radial Basis Function Networks, Universal Approximators, Nonlinear SVM, Decision Trees, Boosting Approach to Combine Classifiers.	8
IV	Feature Selection: Preprocessing, Statistical Hypothesis Testing, The Receiver Operating Characteristics (ROC) Curve, Class Separability Measures, Feature Subset Selection, Optimal Feature Generation, Neural Networks and Feature Generation/Selection, The Bayesian Information Criterion.	8
V	Feature Generation: Linear Transforms, Regional Features, Features for Shape and Size Characterization, Typical Features for Speech and Audio Classification. Template Matching: Introduction, Similarity Measures Based on Optimal Path Searching Techniques, Measures Based on Correlations, Deformable Template Models.	8
Total Hours		40

Course Outcomes:

- **CO1:** Determine classifiers based on Bayes theory for pattern recognition.
- **CO2:** Use linear classifiers to identify the patterns of data.
- **CO3:** Categorize the data using nonlinear classifier algorithms.
- **CO4:** Employ statistical analysis to select the optimal feature set.
- **CO5:** Develop a template matching module to recognize the patterns.

Text Book & Reference Books-

- S. Theodoridis and K. Koutroumbas – *Pattern Recognition*, 4th Edition, Academic Press, 2009.
- C. Bishop – *Pattern Recognition and Machine Learning*, Springer, 2006.
- R. O. Duda, P. E. Hart, D. G. Stork – *Pattern Classification*, Wiley Interscience, 2nd Edition, 2007.
- R. O. Duda, P. E. Hart, D. G. Stork – *Pattern Classification*, Wiley Interscience, 2nd Edition, 2007.
- J. P. Marques de Sá – *Pattern Recognition*, Springer Science & Business Media, 2001.

List/Links of e-learning resource

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Modes of Evaluation and Rubric

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CO-PO Mapping:

COs	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_1	PO_{11}	PO_{12}	PSO1	PSO2
CO-1	3	3	2	3	1							2	3	1
CO-2		2	3	2	3									
CO-3	2	1	2	3	2								1	
CO-4		2	3	2								1		2
CO-5	2		2		2				1				1	

Suggestive list of experiments:

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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DEPARTMENT OF IT

Semester/ Year		VII / IV	Program		B. Tech – IT
Subject Category	DE-6	Subject Code:	IT 704(A)	Subject Name	Object Oriented System Development using UML, Java and Patterns

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10				100	3	0	0	3

Prerequisites:

Programming Using Java, Software Engineering

Course Objective:

Object-oriented software development has become very popular. Also, UML has been accepted as the standard design language. We discuss use of UML to arrive at a design solution. Skeletal java code generation from UML diagrams will be discussed. Design patterns are reusable solutions. These are good solutions to typical programming problems, that can be understood and applied in a specific design situation to improve the overall design and reduce design iterations

UNITs	Descriptions	Hrs.
I	Introduction to 00AD and UML: Concepts like inheritance, UML diagrams: Focus on key diagrams such as: Development using UML, Java and Patterns Total Marks 100 B.Tech-IIT polymorphism, encapsulation, importance of modeling, principles of modeling, and an overview of UML (including its conceptual model and architecture). 00 development life cycle models: Understanding different models for object-oriented development.	8
II	UML diagrams: Focus on key diagrams such as: Use Case Diagram: Capturing functional requirements and interactions between actors and the system. Class Diagram: Representing the static structure of the system, including classes, attributes, operations, and relationships.	8
III	Sequence Diagram: Ilustrating the order of messages exchanged between objects over time. Statechart Diagram (State Machine Diagram): Modeling the behavior of objects as they transition through diferent states in response to events. Object-Oriented Design Process: Moving from analysis to design, including identifying classes, responsibilities, relationships, using tools like CRC cards and Java documentation.	8
IV	Guidelines for class design: Emphasizing encapsulation, interface quality. programming by contract, and unit testing. Interfaces and polymorphism: Deep dive into interface types, polymorphism concepts, and examples in Java.	8
V	Design patterns: Understanding the concept of patterns as reusable solutions to common design problems. GRASP patterns: General Responsibility Assignment Software Patterns. Gang of Four (GoF) patterns: Exploring commonly used creational, structural, and behavioral patterns such as: Creational patterns: Singleton, Factory Method, Abstract Factory, Builder. Prototype. Structural patterns: Adapter, Bridge, aecorator, Facade.Flvweight.proxy. Behavioral patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template method Visitor	8
Total Hours		40

Course Outcomes:

Text Book & Reference Books-

1. Textbooks often cited for such courses include those by Grady Booch, James Rumbaugh, Ivar Jacobson (on UML) and Cay Horstmann (on Object-Oriented Design and Patterns).

List/Links of e-learning resource
● https://archive.nptel.ac.in
Modes of Evaluation and Rubric

CO-PO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO1	PO 11	PO 12	PSO 1	PSO2
CO-1	3	3	2	3	1							2	3	1
CO-2		2	3	2	3									
CO-3	2	1	2	3	2								1	
CO-4		2	3	2								1		2
CO-5	2		2		2				1				1	

Suggestive list of experiments:

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
DEPARTMENT OF IT

Semester/Year		VII/IV		Program		B.Tech – IT
Subject Category	DE-6(C)	Subject Code:	IT 704(B)	Subject Name		Business Intelligence & Analytics

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10				100	3	0	0	3

Prerequisites:

A core course on Business statistics desirable

Course Objective:

This course equips students with necessary knowledge and skills on the thought process, modeling approaches and tools required to use data from the enterprise databases and other sources for business decisions. In turn, the course prepares participants for a career in data science, business analytics and market research. This course will introduce the context of datamining, and cover important modeling techniques such as regression, decision trees, clustering, ANN and text mining.

UNITs	Descriptions	Hrs.
I	Introduction to Business Intelligence & Analytics (BIA), drivers of BIA, types of analytics: descriptive to prescriptive, vocabulary of business analytics,course plan and resources,Architecture of BIA, case analysis of AT&T Long distance, fundamentals of data management, OnLine Transaction Processing (OLTP), design process of databases	8
II	Relational databases, normalization, SQL queries, Shop Sense case of management questions, data warehousing, OnLine Analytical Processing (OLAP), data cube, Descriptive analytics, and visualization, customer analytics, survival analysis, customer lifetime value, case study	8
III	Data mining process, introduction to statistical learning, data pre-processing, data quality, overview of data mining techniques, case study using regression analysis, Introduction to classification, classification techniques, scoring models, classifier performance, ROC and PR curves	8
IV	Introduction to decision trees, tree induction, measures of purity, tree algorithms, pruning, ensemble methods,Tree implementation in Python: problem of targeted mailing, Cluster analysis, measures of distance, clustering algorithms, K-means and other techniques, cluster quality.	8
V	Python, profiling clusters, cluster interpretation and actionable insights, RFM sub- segmentation for customer loyalty, Machine learning, Artificial Neural Networks (ANN), topology and training algorithms, back propagation, financial time series modelling using ANN, implementation in Python, Text mining, process, key concepts, sentiment scoring, text mining using R-the case of a movie discussion forum, summary	8

Total Hours	40
List/Links of e-learning resource	
https://onlinecourses.nptel.ac.in/noc24_cs65/preview	
Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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DEPARTMENT OF IT

Semester/Year		VII/IV		Program		B.Tech – IT
Subject Category	DE-6 (C)	Subject Code:	IT 704(C)	Subject Name		Systems and Usable Security

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Prerequisites:

Computer Networks, Operating Systems, Discrete Mathematics

Course Objective:

This course will give an understanding of the principles of systems security from application viewpoint. Student will obtain hands-on experience on security threats and counter-measures. Goal is to study various types of threats, operating systems security, advanced topics on network security, web security and usable security. After the completion of the course, the student will have understanding of practical aspects of security and will be able to analyze and design the secure systems.

UNITs	Descriptions	Hrs.
I	Introduction: Computer security concepts, threats, attacks; Malicious Software: Types of Malicious Software (Malware), Vulnerability, Exploits, Social Engineering–SPAM E-mail	8
II	Zombie, Bots, Keyloggers, Phishing, Spyware, Operating System Security:System Security Planning, Application Security	8
III	Linux/Unix Security, Windows Security, Virtualization Security, Web Security: Secure E-mail and S/MIME, Domain Keys Identified Mail, Secure Sockets Layer (SSL) and Transport Layer Security (TLS),	8
IV	HTTPS, IPv4 and IPv6 Security, Public-Key Infrastructure and Federated Identity Management., Usable Security: Introduction to Privacy	8
V	Trust and Semantic Security, Visualizing Privacy, Web Browser Security and Privacy, Authentication and Text Passwords, Biometrics and GraphicalPasswords.	8
Total Hours		40

List/Links of e-learning resource

https://onlinecourses.nptel.ac.in/noc22_cs36/preview

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

22/12/18

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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DEPARTMENT OF IT

Semester/Year		VII/IV	Program		B. Tech – IT
Subject Category	PROJECT	Subject Code:	IT 705	Subject Name	Major Project Prelim

Maximum Marks Allotted											
Theory				Practical			Total Marks	Contact Hours			Total Credits
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
-	-	-	-	*100*	*50*	-	*150*	*0*	*0*	*8*	*4*

Prerequisites:

Course Objective:

Knowledge on how edge computing and Internet of Things (IoT) can be used as a way to meet application demands in intelligent IoT systems.

	Descriptions
Procedure	A) Each defined project needs to be from Industry/Research Procedure organization/Govt. organization/socio-technical issues. b) Project identification should be based on Analysis carried out by the students after completion of B.E Semester 6th Examination but before starting of the 7th Semester. c) Problem definition for the project needs to be submitted by every student in the first week of the 7th Semester to his/her college. d) Each definition will be evaluated based on merit in the beginning of the 7th semester itself by the College. **Facilitation:** You may contact your Major Project In charge coordinator/Faculty /Department Head for skilful Analysis.
Guidelines	1. The project work will be in-house industry project, where student need to implement project related to any domain of industry like education , legal, manufacturing, design, pharmaceutical, Ecommerce, etc. 2. Students are required to get approval of project definition from the department. 3. After approval of project definition students are required to report their project work weekly to respective internal guide. 4. Maximum 4 students can allow working in particular project group. 5. The students are required to identify their project within two weeks of the commencement of the classes and they are required to follow all the rules and instructions issued by department. 6. Each student or student group would work under the guidance of the Faculty from the College. In case any problem/other issue arises for the smooth progress of Inter Departmental project work discovery/Practical Training, it should be immediately brought to the notice of the major project in charge coordinators/Faculty. 7. The students are required to submit Project synopsis Pre-report to their Head of the Department with the remarks of guide in their College during Eighth week of the semester.
Course Outcomes	**On successful completion of the project student should be able to:** CO1: identify the problem domain correctly and to represent problem using mathematical structures and logics. CO2: Analyze possible solution strategic and investigate problem domain and design structures

	C04: Acknowledges the previous work and support required in the solution. Justify the role of individual in project work. Demonstrate leadership skills in team work. CO5: Present and communicate the importance of solutions of problem domain. Conduct and accomplish all the subtasks for project completion in time and cost effective manner and conclude the projects work with possible scopes.
Total Hours	112
List/Links of e-learning resource	
Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

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DEPARTMENT OF IT

Semester/Year		VII/IV	Program		B.Tech – IT
Subject Category	PROJ	Subject Code:	IT 801	Subject Name	Major Project

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
-	-	-	-	250	150	-	400	0	0	20	10

Prerequisites:

Course Objective:

	Descriptions
Procedure	A) Each defined project needs to be from Industry/Research Procedure organization/Govt. organization/socio-technical issues. b) Project identification should be based on Analysis carried out by the students after completion of B.E Semester 6th Examination but before starting of the 7th Semester. c) Problem definition for the project needs to be submitted by every student in the first week of the 7th Semester to his/her college. d) Each definition will be evaluated based on merit in the beginning of the 7th semester itself by the College. **Facilitation:** You may contact your Major Project In charge coordinator/Faculty /Department Head for skilful Analysis.
Guidelines	1. The project work will be in-house industry project, where student need to implement project related to any domain of industry like education , legal, manufacturing, design, pharmaceutical, Ecommerce, etc. 2. Students are required to get approval of project definition from the department. 3. After approval of project definition students are required to report their project work weekly to respective internal guide. 4. Maximum 4 students can allow working in particular project group. 5. The students are required to identify their project within two weeks of the commencement of the classes and they are required to follow all the rules and instructions issued by department. 6. Each student or student group would work under the guidance of the Faculty from the College. In case any problem/other issue arises for the smooth progress of Inter Departmental project work discovery/Practical Training, it should be immediately brought to the notice of the major project in charge coordinators/Faculty. 7. The students are required to submit Project synopsis Pre-report to their Head of the Department with the remarks of guide in their College during Eighth week of the semester.
Course Outcomes	**On successful completion of the project student should be able to:** CO1: identify the problem domain correctly and to represent problem using mathematical structures and logics. CO2: Analyze possible solution strategic and investigate problem domain and design structures feasible solutions for it.

	C04: Acknowledges the previous work and support required in the solution. Justify the role of individual in project work. Demonstrate leadership skills in team work. CO5: Present and communicate the importance of solutions of problem domain. Conduct and accomplish all the subtasks for project completion in time and cost effective manner and conclude the projects work with possible scopes.

Total Hours	280
List/Links of e-learning resource	
https://onlinecourses.nptel.ac.in/noc22_cs36/preview	
Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

23/12/20