SVKM's NMIMS Deemed-to-be University
Mukesh Patel School of Technology Management and Engineering

Program: B Tech and MBA Tech all branches (except B Tech CSBS and B Tech CSE (DS)) / B Tech Integrated Civil				**Semester:** VI / X	
Course: Interpersonal Skills				**Code:** 702BS0C063	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE)**
0	**2**	**0**	**1**	**Marks Scaled to 50**	**-**

Pre-requisite: Nil

Course Objective:

The course aims to build and enhance skills critical to future employability through a medley of activities and simulation practices. Also vital skills like persuasion, team participation, self-branding and workplace communications are developed through this course

Course Outcomes

After completion of the course, the student will be able to -

1. Demonstrate awareness of business networks and communicate appropriately in various contexts
2. Illustrate the knowledge of team dynamics to work productively in teams and participate effectively in contexts such as group discussions
3. Apply persuasive communication strategies to articulate themselves in situations such as personal interviews
4. Create social media plans and employment related documents to showcase their personal brand

Detailed Syllabus

Unit	Description	Duration
1.	**Corporate Communication** Workplace hierarchy and importance of Formal and Informal Networks, Cross cultural communication, Business etiquette and netiquette, Corporate presentations-sales and elevator pitch, advanced features in Power-Point (zoom, morph), data and non-data driven graphics in presentations	**06**
2.	**Group and Team Dynamics** Group Discussions(GD) - speaking in GDs, discussing problems and solutions, creating a cordial and cooperative atmosphere, using persuasive strategies, being polite and firm, turn-taking strategies, effective intervention, reaching a decision, Organizational GD, GD as part of selection process: characteristics, evaluation and analysis Dynamics of group formation, the dysfunctions of groups and teams: norm violation and role ambiguity, groupthink and group-polarization, team building exercises	**08**
3.	**Employment Communication** Self-branding through social media, resume-traditional and non-traditional formats- scannable, video portfolios, visual, etc.; cover letters-solicited and unsolicited	**08**

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4.	**Personal Interviews** Virtual hiring practices; stages of interview: face-to-face interviews: causes of failure in an interview, types of interview questions, mock interviews	**08**
	Total	**30**

Text Books

1. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practices*, 3rd ed., Oxford University Press, 2015
2. Fred Luthans, *Organisation Behaviour: An Evidence Based Approach,* 12th ed. McGraw Hill, 2013

Reference Books

1. Frances Trought, *Brilliant Employability Skills,* 2nd ed. Pearson, 2017.
2. S P Robbins, Timothy A Judge and Neharika Vohra, *Organizational Behavior*, 15th ed., Pearson, 2013
3. Scot Ober and Newman Amy, *Contemporary Business Communication*, 8th ed., Biztantra Publications, 2017
4. Cliff Atkinson, *Beyond Bullet Points*,4th ed., Pearson Education, 2018

Laboratory Work

- 8 to 10 Practical activities based on the syllabus

(Prepared by Corned Faculty/HOD)

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AY 2024 - 25

Program: B Tech (Artificial Intelligence, Data Science, Computer Engineering, Information Technology, AI and ML, AI and DS, CSE (Cyber), CSE (DS)) MBA Tech (All Programs) B Tech Integrated (Data Science, Computer Engineering)	**Semester:** IV/V/VI/ V-VII/ VIII/ IX
Course: Mobile Application Development	**Code:** 702AI0E002

Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 100)**	**Term End Examinations (TEE)**
2	2	0	3	Marks Scaled to 100	-

Prerequisite: Knowledge of Programming

Course Objective

The objective of this course is to gain insights into the Android and IOS Operating systems and to understand the components and layouts of these applications. It will also help the students to implement database connectivity with real-time databases and further develop an Android/IOS based application.

Course Outcomes

After completion of the course, students will be able to -

1. Design user interfaces using Android Studio and Flutter
2. Implement file handling using text and images
3. Implement database connectivity and location tracking
4. Develop a full-fledged Android/IOS application

Detailed Syllabus

Unit	Description	Duration
1.	**Configuration of Development Platform** Starting an Android Application project/IOS Application Project: Installing the Application Development Kit (Android Studio / IOS)	**02**
2.	**Understanding the different Components for Application Design** Screen Layout, Simple Controls, Creating and Configuring an Android Emulator, Communicating with the Emulator. Controls and the User Interface: Check Boxes, Radio Buttons, Spinner, Date Picker, Touch Listener, Graphics. Multiscreen Applications: Stretching the Screen, Pop-up Dialog Boxes and Toasts, Menus.	**10**
3.	**Inputting Images and File Handling** Displaying Images, Using Images stored on the Android Device, File handling using .txt and .csv files	**04**
4.	**Location Tracking** Location Tracking using Google maps	**02**
5.	**Introduction to Flutter** Understanding the configuration and UI development using Flutter	**04**
6.	**Processing using Databases** Database connectivity using SQLite 3 and Firebase	**05**

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7.	**Application Publishing** Client-Server Applications and Publishing your application	**03**
	Total	**30**

Text Books

1. John Horton, *Android Application Development for Java Programmers*, 3rd Edition, Packt Publishing, 2021.
2. Barry Burd, *Flutter for Dummies*, 1st Edition, 2020.

Reference Books

1. Barry Burd , *Android Application Development All in one for Dummies*, 3rd Edition, July 2020.
2. Rick Boyer, *Android 9 Development Cookbook*, 3rd Edition, Packt Publishing, 2018.
3. Alessandro Biessek, *Flutter for Beginners*, 1st Edition, Packt Publishing, 2019.

Laboratory Work

8 to 10 experiments (and a practicum where applicable) based on the syllabus

Signature
(Head of the Department)

Program: B Tech IT / MBA Tech IT				**Semester: VI**	
Course: Machine Learning Algorithms				**Code:** 702IT0C020	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks - 100)**
2	2	0	3	Marks Scaled to 50	Marks scaled to 50

Pre-requisite: Probability and Statistics, Data Warehousing and Mining

Course Objective

The objective of this course is to provide an introduction to various algorithms for supervised and unsupervised learning.

Course Outcomes

After completion of the course, student would be able to-

1. Use machine learning algorithms to solve problems
2. Assess the performance of machine learning algorithms
3. Recommend a suitable algorithm for a given problem

Detailed Syllabus

Unit	Description	Duration
1	**Introduction** Overview of machine learning; parametric vs non-parametric; supervised and unsupervised learning; regression and classification; assessing model accuracy	2
2	**Unsupervised and supervised learning review** Simple linear regression; Naïve Bayes; decision trees for classification; clustering	2
3	**Unsupervised learning** Principal Component Analysis, PCA for feature extraction (Eigenfaces example)	3
4	**Regression** Multiple linear regression, extensions of the linear model – interaction, polynomial regression; Regularization – Ridge and Lasso	4
5	**Tree based methods** Regression trees; Trees v/s regression models; Ensemble learning: Bagging, Random Forests, Boosting	4
6	**Classification** Logistic regression; Support Vector Machines: Maximal margin classifier, support vector classifier, SVM kernels (radial, polynomial)	5
7	**Introduction to Neural networks** Single layer, multilayer; convolutional neural networks; recurrent neural networks; fitting a neural network	5
8	**Unsupervised learning – Clustering** Density Based clustering (DBSCAN)	2
9	**Model evaluation and improvement**	3

	Cross-validation, stratified k-fold CV, Evaluation metrics and scoring	
	Total	**30**

Text Books

1. Andreas C. Müller & Sarah Guido, *Introduction to Machine Learning with Python: A Guide for Data Scientists*, 1st edition, O'Reilly Media Inc, 2017.
2. James, G., Witten, D., Hastie, T., & Tibshirani, R. *An Introduction to Statistical Learning*, 2nd edition, New York: Springer, 2021.

Reference Books

1. Alpaydin, Ethem. *Introduction to Machine Learning*, 4th edition, MIT press, 2020.
2. Christopher M. Bishop. *Pattern Recognition and Machine Learning*, 1st edition Springer-Verlag, Berlin, Heidelberg, 2016 (reprint)
3. Tom Mitchell, *Machine Learning*, 1st Indian edition, McGraw Hill, 2017,
4. Hal Daume III, *A Course in Machine Learning*, Online book. www.ciml.info (v 0.99 beta pre-release)

Laboratory Work

8 to 10 Programming exercises (and a practicum) based on the syllabus.

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Signature
(Head of the Department)

Program: B. Tech. IT / MBA Tech. IT				**Semester:** VI	
Course : Software Project Management				**Code:** 702IT0C024	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks---)**
1	2	0	2	Marks Scaled to 50	-

Pre-requisite: Software Engineering

Course Objective

This course imparts skills needed for management of software projects. Students will learn methods of project cost estimation and time estimation, planning and evaluation

Course Outcomes

After completion of the course, the student will be able to –

1. Understand the process of project planning and design of a software project
2. Analyse a project to provide project schedule and cost estimates
3. Apply risk analysis techniques to develop risk management and mitigation plan
4. Understand project monitoring and controlling software deliverables

Detailed Syllabus

Unit	Description	Duration
1	**Introduction to Software Project Management** Problems with Software Projects, Setting objectives, requirement specification, management control, Step Wise Project Planning.	2
2	**Project Planning** Work break down structure, Product Breakdown Structure, RACI Matrix, Gantt Charts, Scheduling, Time Estimating and Compressing the schedule.	3
3	**Cost Estimating and Budgeting** Resource Planning, Cost Estimating, Project Cost System, Budgeting Cost	4
4	**Risk Management** Hazard analysis, risk planning and control, evaluating risks to the schedule.	2
5	**Resource Allocation** Scheduling resources, creating critical paths, counting the cost, cost schedules, the scheduling sequence	3
6	**Monitoring and Control** Creating the framework, cost monitoring, prioritizing monitoring, change control.	1
	Total	**15**

Text Books:

1. Bob Hughes and Mike Cotterell, *Software Project Management*, 6th Edition, Tata McGraw Hill, 2018.

Reference Books:

1. Kathy Schwalbe, *Project Management in IT*, Paperback, Cengage Learning, 2013.
2. Clements, Gido, *Effective Project Management*, Cengage Learning, 2012

Laboratory Work

8 to 10 Programming exercises (and a practicum) based on the syllabus.

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Signature
(Head of the Department)

Program: B. Tech. IT / MBA Tech. IT / B. Tech. Computer Science and Engineering (Cybersecurity)				**Semester : VI**	
Course : System Administration				**Code:** 702IT0C023	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks- 50)**	**Term End Examinations (TEE) (Marks- -)**
1	2	0	2	Marks Scaled to 50	-

Pre-requisite: Operating Systems , Computer Networks

Course Objective

Objective of this course is to provide the knowledge and hands-on skills necessary for system administration. Students will understand basic principles of System administration. They will be able to manage and secure systems and networks.

Course Outcomes

After successful completion of the course, students will be able to -

1. Demonstrate various System admin tasks.
2. Configure various application servers.
3. Secure Linux system.

Detailed Syllabus

Unit	Description	Duration
1.	**Introduction to System Administration** Thinking About System Administration, System Administrator duties, principles of system administration, linux server installation.	**1**
2.	**User Management** Becoming super user, creation of user and group, deletion of user and group, user password management, user profiles, managing file permissions, setting up public key authentication.	**1**
3.	**Network management** Configuring network interface, network sniffing, troubleshooting network problems, ssh client and server configuration**,** Configuring DNS, DHCP, apache web server and squid, load balancing	**4**
4.	**Disk Management** Understanding disk devices, disk partitioning, file systems, mounting, troubleshooting tools, uuid's and logical volume management.	**1**
5.	**System Management** **B**ooting process review, boot loaders, BIOS vs UEFI, init, systemd and runlevels, job scheduling, logging, memory management, resource monitoring, package management, process management	**2**
6.	**Network storage** installing and configuring samba server and FTP server	**2**
7.	**Cloud computing** Setting and configuring cloud using open stack, managing services with juju	**1**
8.	**Security**	**2**

	SUID, SGID, Sticky bit, ACL, file links, iptables, encrypting and decrypting disks	
9.	**Backup and Restore** Planning for Disasters and Everyday needs, Backing Up Files and file systems, cresting system image and bootable recovery media. Restoring Files from Backups	**1**
	Total	**15**

Text Books

1. Wale Soyinka, *Linux Administration: A Beginner's Guide*, 8th Edition, McGraw Hill, 2020.

Reference Books

1. T. A. Limoncelli, C. J. Hogan and S. R. Chalup, *The Practice of System and Network Administration*, 3rd Edition, Pearson, 2017.
2. Evi Nemeth et al, *UNIX and Linux System Administration Handbook*, 5th Edition, Pearson Education, 2020.
3. Schaumann, J. *Principles of System Administration.* Retrieved from **https://www.netmeister.org/book/principles-of-system-administration.pdf** , 2021.

Laboratory Work

8 to 10 Programming exercises (and a practicum) based on the syllabus.

Signature
(Head of the Department)

Program: B Tech/MBA Tech Information Technology				**Semester : V**	
Course: Computer Graphics				**Code:** 702IT0E014	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks- 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Programming for Problem Solving

Course Objective

To introduce the basics of 2-D and 3-D graphics primitives to the students. The course focuses on concepts of computer graphics through theoretical, algorithmic and advanced modelling aspects along with, applications in 3D graphics and visualization. The course also covers part of OpenGL for graphics.

Course Outcomes

After completion of the course, the student will be able to -

1. Describe different computer graphics hardware and its functionality
2. Apply Basic Raster graphics algorithm for drawing 2-D primitives
3. Apply different 2-D and 3-D geometric transformations, viewing and clipping technique
4. Demonstrate hidden surface elimination, curve and light shading techniques

Detailed Syllabus

Unit	Description	Duration
1.	**Introduction** Application areas, Input & Output Devices, Video Display Devices, Refresh CRT, Raster scan display, Colour CRT Monitor, Flat panel display, Co-ordinate Representation.	**03**
2.	**Basic Raster Graphics Algorithm for drawing 2-D Primitives** Line Drawing Algorithm, DDA Algorithm, Bresnham Algorithm, Midpoint Circle Algorithm, Midpoint Ellipse Algorithm, Inside – outside Test, Area Filling Scan Line Polygon filling, Boundary fill algorithm, Flood-fill Algorithm.	**08**
3.	**Geometric Transformation** Window & View Port, their relationship, World Co-ordinates, Normalized device co-ordinates. **2D Basic Transformations** Translation, Rotation & Scaling, Other Transformations, Reflection & Shear, Composite Transformation. **3D Basic transformation** Translation, Rotation & Scaling, Other Transformation: Reflection, & Shear, Composite Transformation.	**07**
4.	**Viewing and Clipping** Liang-Barksy Clipping, Midpoint Subdivision, Polygon, Sutherland-Hodgman Algorithm. **3-D Concepts** 3-D Display Methods, Parallel & Perspective Projections, Depth Cueing, 3-D viewing & Clipping. **Hidden Surface Elimination Method** Backface detection, Depth or Z-Buffer Method, Scan Line Method, Area Subdivision Method.	**06**
5.	**Curves & Light Shading**	**06**

	Spline representation, Bezier Curves, B-Pline. **Illumination Method** Shading Constant Intensity Shading, Gouraud Shading, Phong Shading, Halftoning, Ray Tracing	
	Total	**30**

Text Books

1. Donald Hearn and M. Pauline Baker, *Computer Graphics with OpenGL*, 4th Edition, Pearson Education, 2013.
2. Peter Shirley, *Fundamentals of Computer Graphics*, 3rd Edition, A K Peters, 2009.

Reference Books

1. David Rogers and J. Alan Adams, *Mathematical Elements for Computer Graphics*, 2nd Edition , McGraw-Hill Education, 2017.
2. D. Hearn, M.P. Baker and Warren Carithers, *Computer Graphics with OpenGL Version*, 4th Edition, Pearson Education, 2011.

Laboratory Work

8 to 10 programming exercises based on the syllabus.

Signature
(Head of the Department)

Program: B Tech/MBA Tech Information Technology				**Semester:** VI	
Course: Database Administration				**Code:** 702IT0E038	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks - 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Database Management System

Course Objective

This course is designed to provide knowledge for enabling database development, design, and implementation. At the end of the course, students would be able to implement information systems using DBMS technology.

Course Outcomes

After completion of the course, student would be able to-

1. Describe the fundamentals of Database Administration
2. Analyze the Network Architecture and implement Database security
3. Design Database backup and recovery procedures, apply performance tuning operations

Detailed Syllabus

Unit	Description	Duration
1	**Database Overview and Architecture** Introduction to database administration, Database memory structures, DBA tasks, types of DBA, Impact of newer technology on DBA, DB installation	4
2	**Managing the database Instance** Access database instance, Modify database initialization parameters , stages of database startup, alert log ,repository and data dictionary	2
3	**User Access and Database Security** Managing user accounts, Granting and revoking privileges, Managing user groups ,managing roles and privileges, querying role information	4
4	**Database File Management** Managing control files, Maintaining and monitoring redo log files, storing data (create, alter, analyzing, querying table information), Managing indexes and constraints, managing schema objects	4
5	**Introduction to Network Administration** Network design considerations, network responsibilities for the DBA, Network configuration, Oracle Net features, Oracle Net Stack Architecture. Oracle shared server Infrastructure, additional listeners.	4
6	**Backup and Recovery** Backup terminology , instance recovery , control file, checkpoints , redo log files, archived log files , performing database backup, Oracle RMAN.	4

7	**Performing Database Recovery** Types of Database failure, types of recovery, Performing recovery operations, Backing the database, full vs incremental backups.	4
8	**Performance Tuning** Tuning methodology overview, General tuning concepts, Case Study: Remote Databases & Virtual DBA	4
	Total	**30**

Text Books

1. Craig S Mullins, Database Administration: *The Complete Guide to DBA Practices and Procedures*, 2nd Edition, Addison Wesley Professional, 2013.

Reference Books

1. Abraham Silberschatz, Henry Korth, S Sudarshan, *Database System Concepts*, 7th Edition, McGraw-Hill, 2019.
2. Brian Peasland, *Oracle DBA Mentor Succeeding as an Oracle Database Administrator*, 1st Edition, 2019.
3. Roopesh Ashok Kumar , *Oracle Database 2 Day DBA*, 19c, Oracle Press, 2020.

Laboratory Work

8 to 10 Programming exercises based on the syllabus.

Signature
(Head of the Department)

Program: B Tech CSE(Cybersecurity)/B Tech and MBA Tech IT				**Semester : IV/VI**	
Course : Introduction to Cryptography				**Code:** 702IT0C006	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks- 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Basic Probability Theory

Course Objective

This course is an introduction to Cryptography. It introduces the concepts used in traditional as well as modern cryptography. Students will learn various symmetric and asymmetric cryptographic algorithms and its application.

Course Outcomes

After completion of the course, the student will be able to -

1. Explain and implement various symmetric key cryptographic algorithms
2. Explain and implement various asymmetric key cryptographic algorithms
3. Describe various attacks on cryptosystems

Detailed Syllabus

Unit	Description	Duration
1.	**Overview of Cryptography and Its Applications** Introduction, security goals (CIA triad), Goals of cryptography, principles of modern cryptography, perfectly secret encryption, one time pad and Shannon's theorem, cryptographic applications.	**04**
2.	**Classical cryptosystems** Shift Ciphers, Affine Ciphers, The Vigenère Cipher, Playfair Ciphers, Substitution Ciphers, Transposition Ciphers, stream and block ciphers, Cryptanalysis.	**04**
3.	**Symmetric Key Cryptography** Integer and modular arithmetic, Extended Euclidean Algorithm, Linear Congruence, Algebraic structures (Group, Rings, and Fields), Galois Field, Modern Block Cipher and its components(D- Boxes and S-Boxes), product ciphers, stream ciphers (FSR and LFSR), attacks on stream and block ciphers, DES and AES, modes of operations.	**08**
4.	**Mathematics for Asymmetric Key Cryptography** Primes, primality testing, factorization, Chinese remainder theorem, Quadratic Congruence, Fermat's little theorem, Euler's theorem.	**03**
5.	**Asymmetric Key Cryptography** RSA Cryptosystem, Rabin Cryptosystem, ElGamal Cryptosystem, Elliptic Curve Cryptosystem.	**05**
6.	**Key Management** Key Distribution Centre, Needham-Schroeder Protocol, Kerberos, Diffie,-Hellman Key Agreement, Certification Authority, Public-Key infrastructure (PKI).	**03**
5.	**Hash Functions and Digital Signature**	**03**

	Introduction, MD Hash family, SHA1,2,and 3, attacks on hash functions, RSA Signatures, Digital Signature Algorithm, Birthday Attack on signatures, Message Authentication Code.	
	Total	**30**

Text Books

1. B. Forouzan and D. Mukhopadhyay, *Cryptography and Network Security*, 3rd Edition, McGraw Hill, 2016.

Reference Books

1. Kahate, *Cryptography and Network Security*, 4th Edition, McGraw Hill, 2019.
2. W. Stallings, *Cryptography and Network Security: Principles and Practice*, 7thEdition, Pearson, 2017.
3. B. L. Menezes and R. Kumar, *Cryptography, Network Security, and Cyber Laws*, Cengage, 2018.
4. J. Katz and Y. Lindell, *Introduction to Modern Cryptography*, 3rd Edition, CRC Press, 2021.
5. W. Trappe and L. C. Washington, *Introduction to Cryptography with Coding Theory*, 3rd Edition, Pearson, 2020.

Laboratory Work

8 to 10 programming exercises based on the syllabus.

Signature
(Head of the Department)

Program: B Tech / MBA Tech IT and Computer Engineering / B Tech Computer Science/ BTI Computer Engineering				**Semester : VI/X**	
Course : Software Quality Assurance				**Code:** 702IT0E022	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks-100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Software Engineering, Object Oriented Analysis &Design

Course Objective

To understand software quality management process and quality management models. To learn software quality metrics, assurance and various software standards

Course Outcomes

After completion of this course, student will be able to-

1. Classify the various software quality factors
2. Describe and comprehend SQA architecture and its components
3. Identify the different software defects and techniques used for defects removal
4. Evaluate on the basis of Software quality metrics and the standards

Detailed Syllabus

Unit	Description	Duration
1	**Introduction** Software quality challenge, software errors, faults and failures, causes of software errors, software quality and software quality assurance definition.	3
2	**Software quality factors** Need for software quality requirements, classification of software requirements into software quality factors, product operation, revision and transition software quality factors, alternative models of software quality factors, software compliance with quality factor.	4
3	**Components of SQA** SQA system architecture, pre project software quality components, software project lifecycle components, infrastructure components for error prevention and improvement, Management SQA components, SQA standards, system certification and assessment components, human component.	4
4	**Defect removal effectiveness** Software development methodologies, factors affecting QA activities in development process, Verification, validation and qualification, model for SQA defect removal effectiveness and cost, reviews.	4
5	**Software testing** Definition and objectives, testing process, strategies, software test classification, black box and white box, test case design, automated testing, Alpha and Beta site testing programs, Security Testing	4

6	**Maintenance and external participants** Pre maintenance software quality components, Maintenance software quality assurance tools, types of external participants, risks and benefits, assuring quality of external participants, SQA tools for assuring quality of external participants Contribution.	5
7	**Standards** Scope of quality management standards, ISO 9001, ISO 9000- 3, CMM and CMMI, Boot strap methodology, ISO/IEC 15504 model, ISO/IEC 27001 IEEE STD 12207, IEEE STD 1012, IEEE STD 1028.	3
8	**Software quality metrics** Objective and classification of software quality metrics, process metrics and product metrics, implementation and limitation of software quality metrics.	3
	Total	**30**

Text Books

1. Daniel Galin, *Software Quality Assurance: From Theory to Implementation*, 2nd Edition, Pearson Education, 2012.

Reference Books

1. Milind Limaye, *Software quality assurance*, Tata McGraw-Hill Education, 2011.
2. Gordon Schulmeyer, *Handbook of Software Quality Assurance.* 4th Edition, Artech House, 2008.

Laboratory Work

8 to 10 experiments Programming exercises based on the syllabus.

Signature
(Head of the Department)

Program: B Tech IT / MBA Tech IT and Computer Engineering / B Tech (Intg) EXTC				**Semester: VI/ VIII/ XII**	
Course: Cyber Forensics				**Code:** 702IT0E024	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks - 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Basic Knowledge of Computer Network, Operating Systems and programming

Course Objective

This course is an introduction to the field of cyber forensics. This course introduces various aspects of cyber forensics to the students. Students will learn about various methods, tools and techniques to perform forensic operations on a given media.

Course Outcomes

After completion of the course, students would be able to-

1. Describe Windows and Linux File systems
2. Perform various forensics operations on a given media
3. Describe various professional, ethical and legal issues related to cyber forensics

Detailed Syllabus

Unit	Description	Duration
1	**Introduction to cybercrime and cyber forensics** Definition of cybercrime, type and classification of cybercrimes, Overview of cyber forensics, forensic process, types of investigations, digital evidence, data acquisition and forensic imaging, digital forensic tools, and Incident Response	6
2	**File System Analysis** Understanding file systems, booting process, disk drives and solid-state devices, FAT and NTFS file systems, partition table and MFT, understanding whole disk encryption, Windows registry, file structure of ext4.	6
3	**Data Analysis** Preparation for forensic analysis, data carving, recovering graphics files and header analysis, email and internet activity analysis, data hiding techniques, malware analysis	6
4	**Network Forensics** Overview, analyzing network traffic, network-based evidence, investigating routers.	4
5	**Mobile Device Forensics** Mobile phone basics, inside mobile devices, acquisition procedure for mobile devices, mobile forensic tools.	2
6	**Legal, Professional and Ethical issues** Cyber laws in India, various ethical dilemma, professional conduct, and report writing	4
7	**Case Study**	2

	Total	**30**

Text Books

1. B. Nelson, A. Philiips and C. Steuart, *Guide to Computer Forensics and Investigations*, 6th Edition, Cengage, 2019.
2. N. Jain and D. R. Kalbande, *Digital Forensic: The Fascinating World of Digital Evidences* , Wiley India, 2019.

Reference Books

1. Dejey and S. Murugan, *Cyber Forensics*, 1st Edition, Oxford University Press, 2018.
2. C. Easttom, *System Forensics, Investigation, and Response*, 3rd Edition, J B Learning, 2019.
3. N. Reddy, *Practical Cyber Forensics*, 1st Edition, Apress, 2019.

Laboratory Work

8 to 10 Programming exercises based on the syllabus.

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Signature

(Head of the Department)

Program: B Tech IT / MBA Tech IT					**Semester:** VI
Course: Advanced Web Programming					**Code:** 702IT0E025
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	2	0	3	Marks Scaled to 50	Practical Examination Scaled to 50 Marks

Pre-requisite: Web Programming

Course Objective

This course would enable students to create dynamic web sites using ASP.NET as a web development platform of the .NET framework. C# would be the language used for writing application code and ADO.Net technology as database control for retrieving, manipulating, and updating data.

Course Outcomes

After completion of the course, the student will be able to -

1. Develop a project using ASP.Net with basic C# and Object Oriented C#
2. Create dynamic web applications using ASP.NET
3. Implement backend database with controls using ADO.Net technology

Detailed Syllabus

Unit	Description	Duration
1	**Introducing .NET** The .NET Framework, C#, Common Language Specifications, The Common Language Runtime, The .NET Class Library.	2
2	**C# Language** C# Language Basics, Variables and Data Types, Variable Operations, Object-Based Manipulation, Conditional Logic, Loops, Methods.	4
3	**C# Types, Objects, and Namespaces** The Basics About Classes, Building a Basic Class, Value Types and Reference Types, Understanding Namespaces and Assemblies.	4
4	**ASP .NET Fundamentals** Writing Code, Using the Code-Behind Class, Adding Event Handlers, Understanding the Anatomy of an ASP.NET Application, Introducing Server Controls, Using the Page Class, Using Application Events, Configuring an ASP.NET Application.	4
5	**Form Controls** Stepping Up to Web Controls, Web Control Classes, List Controls, Table Controls, Web Control Events and AutoPostBack, Validation, Understanding Validation, Using the Validation Controls, Rich Controls, Calendar, AdRotator, Pages with Multiple Views, User Controls and Graphics, User Controls, Dynamic Graphics, Chart Control, Website Navigation: Site Maps, URL Mapping and Routing, The SiteMapPath Control, TreeView Control, Menu Control.	4

6	**Error Handling, Logging, and Tracing** Avoiding Common Errors, Understanding Exception Handling, Handling Exceptions, Throwing Your Own Exceptions, Using Page Tracing. **State Management** Understanding the Problem of State, Using View State, Transferring Information Between Pages, Using Cookies, Managing Session State, Configuring Session State, Using Application State, Comparing State Management Options, Styles, Themes, and Master Pages.	4
7	**ADO.NET Fundamentals** Understanding Databases, Configuring Your Database, Understanding SQL Basics, Understanding the Data Provider Model, Using Direct Data Access, Using Disconnected Data Access. **Data Binding** Introducing Data Binding, Using Single-Value Data Binding, Using Repeated-Value Data Binding, Working with Data Source Controls. **The Data Controls** GridView, Formatting the GridView, Selecting a GridView Row, Editing with the GridView, Sorting and Paging the GridView, Using GridView Templates, The DetailsView and FormView	8
	Total	**30**

Text Books

1. Adam Freeman, Matthew MacDonald, Mario Szpuszta, *Pro ASP .NET 4.5 in C#*,, 5th Edition, Apress, 2014.

Reference Books

1. Matthew Macdonald, *The Complete Reference ASP.Net*, Indian Edition, McGraw Hill Education, 2017.
2. Imar Spaanjaars, *Beginning Asp.Net 4.5 in C# and VB*, 1st Edition, John Wiley & Sons, 2013.

Laboratory Work

8 to 10 Programming exercises (and a practicum) based on the syllabus.

Signature
(Head of the Department)

Program: B Tech/MBA Tech IT				**Semester:** VI	
Course: Blockchain Technology				**Code:** 702IT0E016	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Programming (Java, Python)

Course Objective

The objective of this course is to introduce students to various technical and functional aspects of Blockchain and provide foundation for building any blockchain solution using Blockchain Technology.

Course Outcomes

After completion of the course, students will be able to –

1. Explain the concepts of Blockchain technology
2. Identify various types of Blockchains and Consensus Mechanisms, Smart Contracts and Use cases
3. Use Blockchain platform for building solutions to real time applications

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction To Blockchain** Distributed DBMS – Limitations of Distributed DBMS, Introduction to Block chain – History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain.	04
2	**Blockchain Architecture** Types of Blockchain-Public, Private, Permissioned, Hybrid Blockchains, Shared Ledger, Tokenized and Tokenless Blockchains Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain- Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET)	08
3	**Blockchain-Based Futures System** Introduction, Characteristics, Contractual Confidentiality, Smart Contract Languages, Oracles, Deploying Smart Contracts on Blockchain	04
4	**Ethereum Basics:** Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts, Writing smart contracts using Solidity & JavaScript	04
5	**Privacy, Security Issues in Blockchain** Pseudo-anonymity vs. anonymity, attacks on Blockchains: Sybil attacks, selfish mining, 51% attacks advent of algorand; Sharding based consensus algorithms to prevent these attacks	04

6	**Blockchain Application Development** Identifying Blockchain Platform, Proof of Concept, Development, Deployment, Blockchain Upgrades, Phases of Blockchain Implementation, Introduction to Blockchain Storage: IPFS, BigChainDB	04
7	**Use Cases of Blockchain Technology** Introduction, Blockchain Adoption, Use Cases: Finance, Education, Health, Government.	02
	Total	**30**

Text Books

1. Imran Bashir, Packt, "Mastering Blockchain", 2nd Edition, *Packt* Publishing, 2019.
2. Kumar Saurabh, Ashutosh Saxena, "Blockchain Technology: Concepts and Applications", 1st Edition, Kindle Edition, 2020.

Reference Books

1. Elad Elrom, "Edition The Blockchain Developer: A Practical Guide for Designing, Implementing, Publishing, Testing, and Securing Distributed Blockchain-based Projects, 1st ed. *Elad Elrom,* 2019.

Laboratory Work

8 to 10 Programming exercises (and a practicum) based on the syllabus.

Signature
(Head of the Department)

Program : B Tech / MBA Tech [EXTC/ Information Technology/ Computer Engineering/ CSBS/ CSE(DS) 311 (VT)] BTI (EXTC / Computer Engineering)				**Semester : V / VI / VIII IX /XII**	
Course : Image and Video Processing				**Code :** 702EX0E004	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks - 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Basic operations on 2D arrays

Course Objective

This course introduces concepts, methodologies and performance metrics for still image and motion picture processing. It also helps to develop a foundation for further study and research in the signal processing domain.

Course Outcomes

After completion of the course, students will be able to -

1. Apply image enhancement and image transform techniques on images.
2. Implement morphology operations to highlight objects
3. Analyze effect of various edge detection and segmentation techniques on images
4. Comprehend fundamentals of video processing

Detailed Syllabus

Unit	Description	Duration
1.	**Image fundamentals** Representation of digital image, basics of colour image spatial and gray level resolution, basic relationships between pixels, 4, 8 and m connectivity, distance measures-Euclidean distance and m path, image file formats (TIFF, PNG, JPEG).	**03**
2.	**Image enhancement** **Point processing techniques** Linear- digital negative, Piecewise linear-contrast stretching, thresholding, intensity level slicing, Nonlinear- log transformation, power law transformation, **Neighborhood processing techniques**-smoothing spatial filters, sharpening spatial filters, median filters **Histogram processing**-histogram equalization.	**06**
3.	**Image transforms** Hadamard transform, Discrete cosine transform and its applications for image compression	**02**
4.	**Morphological image processing** Dilation, erosion, opening, closing, Hit–or-Miss transformation, basic morphological algorithms- boundary extraction on binary images, thinning, thickening, gray scale morphology	**04**

5.	**Edge Detection** Gradient based edge detection- First order and second order derivative, Simple edge operators- Prewitts, Sobel	**02**
6.	**Image segmentation** Segmentation using thresholding, Otsu method, region based segmentation- region growing, region splitting and merging.	**03**
7	**Colour Image Processing** Colour fundamentals and colour models (RGB, CMY, CMYK, HSI, YUV, HSV), model transformation, colour slicing, histogram processing of colour images.	**04**
8	**Fundamentals of digital video and its compression** Video representation- temporal correlation, video frame classifications, I, P and B frames, Fundamentals of motion estimation, motion estimation algorithms-exhaustive search block matching, 2D-log search method and 3 step search method.	**06**
	Total	**30**

Text Books

1. R.C Gonzalez and Richard Woods, *Digital Image Processing*, Pearson publication, 4th Edition, 2018.
2. Wilhelm Burger and Mark J. Burge, *Digital Image Processing: An Algorithmic Introduction*, Springer publications, 2nd Edition, 2022.

Reference Books

1. Alasdair McAndrew, *A Computational Introduction to Digital Image Processing,* CRC Press, 2nd Edition, 2021
2. Syed Jahangir Badashah, *Digital Image Processing,* Lambert Academic Publishing, 2020

Laboratory Work

8 to 10 practical exercises (and a practicum) based on the syllabus.

Signature
(Head of the Department)

Program: B Tech / MBA Tech (EXTC/ Information Technology/ Artificial Intelligence)					**Semester: V / VI / VII**
Course : Internet of Things (IoT)					**Code:** 702EX0E003
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks-50)**	**Term End Examinations (TEE) (Marks -100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Digital Logic Design

Course Objective

This course aims to acquaint students with the fundamentals of the Internet of Things (IoT) and its building blocks. It helps to understand the IoT hardware and various protocols used in IoT applications for everyday life. It also provides information on associated technologies like cloud computing and hands-on expertise in building IoT applications.

Course Outcomes

After completion of the course, students will be able to -

1. Describe the fundamentals of IoT
2. Demonstrate appropriate use of protocols and cloud services for a given application
3. Distinguish the IoT data using various data analytics methods
4. Construct IoT based projects using suitable hardware boards.

Detailed Syllabus

Unit	Description	Duration
1.	**Introduction to IoT** Introduction and definition of IoT, IoT growth – A statistical View, Application areas of IoT, Characteristics of IoT, IoT stack, Enabling Technologies – Sensors, Cloud Computing, Big data Analytics, Embedded Computing Board, Communication protocols and user interface. Internet of Things challenges, IoT levels.	**04**
2.	**IoT hardware interface** Introduction to sensor interfacing, Types of sensors (LDR, Ultrasonic, Obstacle, Heartbeat, Gyro sensor, Gas sensor etc.), overview of Microcontrollers and ARM, Overview of Arduino boards, Node MCU and Raspberry PI board.	**04**
3.	**Protocols for IoT** Networking Architectures: Star, Mesh, Tree, Short distance protocols: IEEE 802.15.4, 6LowPan, Zigbee, Wi-Fi, Messaging protocols: MQTT, CoAP and REST. Addressing and Identification Protocols: IPv4, IPV6 and Uniform Resource Identifier.	**06**
4.	**Cloud for IoT** Introduction, IoT with Cloud, Selection of Cloud services, Introduction of Fog Computing, Cloud Computing: Security aspects, Case study: Adafruit Cloud	**04**
5.	**Data Analytics in IoT** Machine Learning models: Classification, Regression, Clustering, Model building process: Training the model, Testing the model, Validation of Model,	

	Modelling Algorithms: Decision tree, Liner Regression, Logistic Regression, and K means, Model Performance, Introduction to Big Data Platform, Big data pipeline. Case studies on data analytics –	**07**
6.	**Application building with IoT** Getting familiarized with Raspberry Pi: Architecture, Compatible Peripherals, Add-Ons, and Accessories, operating system for Raspberry Pi, setting up and initial configuration of Raspberry Pi, Application development with Raspberry Pi – Web Lamp etc. Case Studies: Smart Cities, Smart Home Industrial Control, Smart Social Networks, Smart warehouse monitoring etc.	**05**
	Total	**30**

Text Books

1. Shriram K Vasudevan, Abishek S Nagarajan and RMD Sundaram, *Internet of Things,* 2nd Edition, Wiley, 2020.
2. Andrew Minteer, *Analytics for the Internet of Things (IoT),* 1st Edition, Packt Publishing Ltd, 2017.

Reference Books

1. Rajkumar Buyya and Amir Vahid Dastjerdi, *Internet of Things: Principles and Paradigms*, 2nd Edition, Morgan Kaufmann, 2016.
2. Harry G. Perros, *An Introduction to IoT Analytics*, 1st Edition, CRC Press, 2021.

Laboratory Work

8 to 10 practical exercises (and a practicum) based on the syllabus.

Signature
(Head of the Department)