Faculty of Engineering and Technology
P. K. University
Shivpuri (MP)

Department of Computer Science Engineering & IT

Evaluation Scheme & Syllabus for

B. Tech. Fourth Year

(VII & VIII Semester)

(Effective from session 2025-26)

EVALUATION SCHEME

SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal &External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	

STUDY AND EVALUATION SCHEME FOR B.TECH. COMPUTER SCIENCE & ENGG.
YEAR 4th/SEMESTER-7th

SUBJECT CODE	SUBJECTS NAME	L	T	P	Credits	Th	Pr	Tot	Th	Pr	Tot	Total
UENTRCO701	Entrepreneurship Development	3	0	0	3	30	-	30	70	-	70	100
UDISTCO702	Distributed System	3	1	0	4	30	-	30	70	-	70	100
UARTICO703	Artificial Intelligence	3	1	0	4	30	-	30	70	-	70	100
USOFTCO704	Software Testing & Audit	3	1	0	4	30	-	30	70	-	70	100
UCRYPCO705	Cryptographic & Network Security	3	0	0	3	30	-	30	70	-	70	100
UMINOCO706	Minor Project	0	0	2	1	-	25	25	-	25	25	50
UDISTCO707	Distributed System	0	0	2	1	-	25	25	-	25	25	50
UINDUCO708	Industrial Training	0	0	2	1	-	25	25	-	25	25	50
Total		15	3	6	21	150	75	225	350	75	425	650

STUDY AND EVALUATION SCHEME FOR B.TECH COMPUTER SCIENCE & ENGG.
YEAR 4th/SEMESTER-8th

SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	Marks In Evaluation Scheme						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
UNONCCO801	Non-Conventional Energy Resources	3	0	0	3	30	-	30	70	-	70	100
UDIGICO802	Digital Image Processing	3	1	0	4	30	-	30	70	-	70	100
UPATTCO803	Pattern Recognition	3	1	0	4	30	-	30	70	-	70	100
UDATACO804	Data Compression	3	0	0	3	30	-	30	70	-	70	100
UMAJOCO805	Major Project	-	0	14	7		100	100		200	200	300
USEMICO806	Seminar	-	0	2	1		25	25		25	25	50
Total		12	2	16	22	120	125	245	280	225	505	750

Department of Computer Science Engineering &IT
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P.K. University, Shivpuri (MP)
IV YEAR VII SEMESTER
UENTRCO701: ENTREPRENEURSHIP DEVELOPMENT

L	T	P
3	0	0

UNIT I
Entrepreneurship- definition. growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries
and sub-control types. 5
Government policy for small scale industry; stages in starting a small scale industry.

UNIT II
Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

UNIT III
Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected
costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation
of financial reports, accounts and stores studies.

UNIT IV
Project Planning and control:
The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. profit planning and programming, planning cash flow, capital expenditure and operations. control of financial flows, control and communication.

UNIT V
Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act. 5
Role of various national and state agencies which render assistance to small scale industries.

Reference Books:
1. Forbat, John, "Entrepreneurship" New AgeInternational.
2. Havinal, Veerbhadrappa, "Management and Entrepreneurship" New **Age International**
3. Joseph, L. Massod, "Essential of Management", Prentice Hall ofIndia.

Department of Computer Science Engineering &IT
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IV YEAR VII SEMESTER
UDISTCO702: DISTRIBUTED SYSTEMS

L	T	P
3	1	0

UNIT I
Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models.
Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared
memory, Logical clocks ,Lamport's& vectors logical clocks.
Concepts in Message Passing Systems: causal order, total order, total causal order, Techniques for
Message Ordering, Causal ordering of messages, global state, termination detection.

UNIT II
Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion
theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms. Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

UNIT III
Agreement Protocols: Introduction, System models, classification of Agreement Problem,Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.
Distributed Resource Management: Issues in distributed File Systems, Mechanism for buildingdistributed file
systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

UNIT IV
Failure Recovery in Distributed Systems: Concepts in Backward and Forward recovery, Recoveryin Concurrent systems, Obtaining consistent Checkpoints, Recovery in Distributed Database Systems. Fault Tolerance: Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamic voting protocols.

UNIT V
Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control,
Timestamp ordering, Comparison of methods for concurrency control.
Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control
in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group
communication, Fault - tolerant services, highly available services, Transactions with replicated data

REFERENCES:
1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGrawHill Ramakrishna,Gehrke," Database Management Systems", McGrawHill
2. Vijay K.Garg Elements of Distributed Compuitng ,Wiley
3. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", PearsonEducation
4. Tenanuanbaum, Steen," Distributed Systems",PHI

Department of Computer Science Engineering &IT
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IV YEAR VII SEMESTER
UARTICO703 ARTIFICIAL INTELLIGENCE

L	T	P
3	1	0

UNIT I
Introduction : Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

UNIT II
Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local
search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

UNIT III
Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov
Models (HMM), Bayesian Networks
.
UNIT IV
Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bays models, Learning with hidden data - EM algorithm, Reinforcement learning,

UNIT V
Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

REFERENCES:
1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. Elaine Rich and Kevin Knight, "Artificial Intelligence",McGraw-Hill
3. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
4. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall ofIndia,

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IV Year VII Semester
USOFTCO704: SOFTWARE TESTING AND AUDIT

L	T	P
3	1	0

UNIT I
Review of Software Engineering:

Overview of software evolution, SDLC, Testing Process, Terminologies in Testing: Error, Fault, Failure, Verification, Validation, Difference between Verification and Validation, Test Cases, Testing Suite, Test Oracles, Impracticality of Testing All data; Impracticality of testing All Paths.
Verification:
Verification methods, SRS verification, Source code reviews, User documentation verification, Software project audit, Tailoring Software Quality Assurance Program by Reviews, Walkthrough, Inspection, and Configuration Audits.
UNIT II
Functional Testing:
Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.
Structural Testing:
Control flow testing, Path testing, Independent paths, Generation of graph from program, Identification of independent paths, Cyclamate Complexity, Data Flow Testing, Mutation Testing.
UNIT III

Regression Testing::
What is Regression Testing? Regression Test cases selection, Reducing the number of test cases, Code coverage
prioritization technique.
Reducing the number of test cases:
Prioritization guidelines, Priority category, Scheme, Risk Analysis.
UNIT-IV:
Software Testing Activities: Levels of Testing, Debugging, Testing techniques and theirApplicability, Exploratory
Testing
Automated Test Data Generation:
Test Data, Approaches to test data generation, test data generation using genetic algorithm, Test Data Generation Tools, Software Testing Tools, and Software test Plan.

UNIT-V:
Object oriented Testing: Definition, Issues, Class Testing, Object Oriented Integration and System Testing.
Testing Web Applications: What is Web testing?, User interface Testing, Usability Testing, Security Testing, Performance Testing, Database testing, Post Deployment Testing.

REFERENCES:
1. Yogesh Singh, "Software Testing", Cambridge University **Press, New York,2012**
2. K..K. Aggarwal&Yogesh Singh, "Software Engineering", New Age International Publishers, New Delhi,2003.
3. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Fifth Edition, McGraw**-Hill International Edition, NewDelhi,2001.**

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IV Year VII Semester
UCRYPCO705: CRYPTOGRAPHY & NETWORK SECURITY

L	T	P
3	0	0

UNIT I
Introduction to security attacks, services and mechanism, Classical encryption techniques-substitution ciphers
and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers.
Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure,
Data encryption standard(DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

UNIT II
Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers,
Extended Euclidean Algorithm,
Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, **Primarily testing,**
Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA

UNIT III
Message Authentication Codes: Authentication requirements, authentication functions, message authentication
code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA)
Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS),
proof of digital signature algorithm,

UNIT IV
Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure.
Authentication Applications:
Kerberos, Electronic mail security: pretty good privacy (PGP), S/MIME.

UNIT V
IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management.
Introduction to Secure Socket Layer, Secure electronic, transaction (SET)
System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls

REFERENCES:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. **Behrouz A. Frouzan: Cryptography and Network Security, Tata McGrawHill**
3. **C K Shyamala, N Harini, Dr. T.R.Padmnabhan Cryptography and Security,Wiley**
4. Bruce Schiener, "Applied Cryptography". John Wiley &Sons
5. Bernard Menezes," Network Security and Cryptography", CengageLearning.
6. AtulKahate, "Cryptography and Network Security", Tata McGrawHill

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IV Year VII Semester

L	T	P
0	0	2

UMINOCO706   Minor Project

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IV Year VII Semester
UDISTCO707   Distributed System lab

L	T	P
0	0	2

1. Simulate the functioning of Lamport's Logical Clock in C.

2. Simulate the Distributed Mutual Exclusion in C.

3. Implement a Distributed Chat Server using TCP Sockets in C.

4. Implement Java RMI" mechanism for accessing methods of remote systems.

5. Simulate Balanced Sliding Window Protocol in C.

6. Implement CORBA mechanism by using C++program at one end and Java program on the other.

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IV Year VII Semester

UINDUCO708: INDUSTRIAL TRAINING

1. Learning professional skills like exercising leadership, behaving professionally, behaving ethically, listening effectively, participating as a member of a team, developing appropriate workplace attitudes

2. Demonstrating understanding of professional customs & practices and working with professional standards

3. Improving problem-solving, critical thinking skills and report writing.

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UNONCCO801: NON CONVENTIONAL ENERGY RESOURCES

L	T	P
3	0	0

UNIT-I

Introduction: Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits.
Solar Cells: Theory of solar cells. solar cell materials, solar cell array, solar cell power plant, limitations.

UNIT-II

Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT-III

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations. 4 Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations. 2 Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

UNIT-IV

Thermo-electrical and thermionic Conversions: Principle of working, performance and limitations.
Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems.

UNIT-V

Bio-mass:
Availability of bio-mass and its conversion theory. 2 Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations. Wave and Tidal Wave:Principle of working, performance and limitations. Waste Recycling Plants.

Text/References Books:
1. Raja etal, "Introduction to Non-Conventional Energy Resources" Scitech Publications.
2. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications,2006.
3. M.V.R. Koteswara Rao, " Energy Resources: Conventional & Non-Conventional "BSP Publications,2006.
4. D.S. Chauhan,"Non-conventional Energy Resources" New Age International.
5. C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners"PHI Learning.
6. Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.

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UDIGICO802: DIGITAL IMAGE PROCESSING

L	T	P
3	1	0

UNIT-I

Introduction and Fundamentals Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception,
A Simple Image Model, Sampling and Quantization.

Image Enhancement in Frequency Domain

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

UNIT II

Image Enhancement in Spatial Domain
Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

UNIT III

Image Restoration A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

UNIT IV

Morphological Image Processing Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex
Hull, Thinning, Thickening

UNIT V

Registration Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth

Segmentation Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection

REFERENCES:
1. Digital Image Processing 2ndEdition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalk off. Published by: John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.
4. Sonka, Digital Image Processing and Computer Vision, Cengage Learning
5. Gonzalez and Woods, Digital Image Processing, AddisonWesley.

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IV Year VIII Semester
UPATTCO803: PATTERN RECOGNITION

L	T	P
3	1	0

UNIT I

Introduction:
Basics of pattern recognition, Design principles of pattern recognition system,Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra, Probability Theory, Expectation, mean and
covariance, Normal distribution, multivariate normal densities, Chi squared test.

UNIT II

Statistical Patten Recognition:
Bayesian Decision Theory, Classifiers, Normal density and discriminate functions,

UNIT III

Parameter estimation methods: Maximum-Likelihood estimation,Bayesian Parameter estimation, Dimension reduction methods – Principal Component Analysis (PCA), Fisher Linear discriminate analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.

UNIT IV

Nonparametric Techniques:
Density Estimation, Parzen Windows, K-Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzy classification.

UNIT V

Unsupervised Learning & Clustering:
Criterion functions for clustering, Clustering Techniques: Iterative square - error partition clustering – K means, agglomerative hierarchical clustering, Cluster validation

REFERENCES:

1.	Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", 2ndEdition, John Wiley, 2006.
2.	C. M. Bishop, "Pattern Recognition and Machine Learning", Springer,2009.
3.	S. Theodoridis and K. Koutroumbas, "Pattern Recognition", 4thEdition, Academic Press,2009

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IV Year VIII Semester
UDATACO804: DATA COMPRESSION

L	T	P
3	0	0

UNIT I

Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.

UNIT II

The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.

UNIT III

Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Move- to-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markoy Compression**.**

UNIT IV

Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform Quantize, Adaptive Quantization, Non uniform Quantization.

UNIT V

Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizes. Structured Vector Quantizes

REFERENCES:

1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers
2. Elements of Data Compression, Drozdek, Cengage Learning
3. Introduction to Data Compression, Second Edition, Khalid Sayood, The Morganaufmann Series
4. Data Compression: The Complete Reference 4th Edition byDavid Salomon,Springer
5. **Text Compression1st Edition by Timothy C. Bell Prentice Hall**

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IV Year VIII Semester

UMAJOCO805   Major Project

L	T	P
0	0	14

1 Analyse and understand the real life problem and apply their knowledge to get programming solution.

2 Engage in the creative design process through the integration and application of diverse technical knowledge and expertise to meet customer needs and address social issues.

3 Use the various tools and techniques, coding practices for developing real life solution to the problem.

4 Find out the errors in software solutions and establishing the process to design maintainable software applications

5 Write the report about what they are doing in project and learning the team working skills .

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IV Year VIII Semester

USEMICO806 Seminar

L	T	P
0	0	2

1. Developing a technical artifact requiring new technical skills and effectively utilizing a new software tool to complete a task

2 . Writing requirements documentation, Selecting appropriate technologies, identifying and creating appropriate test cases for systems.

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