MCA -401
Software Engineering

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-401	Software Engineering	100	60	21	40	14	2

COURSE OBJECTIVES:

1. Apply the concepts of Software Process and Model
2. State the requirements for efficient Project Management
3. Execute the needed steps in Software Design: Requirements, Specification, Architectural Design, and OOD
4. State the steps involved in Program Verification and Validation
5. Execute a thorough Software Test
6. Apply the procedures for Software Quality Assurance and Cost Estimation

Syllabus :

UNIT - I   **Software Engineering Basics**

Introduction, Software Engineering Terminologies, Product Life Cycle, Project Life Cycle Models- Spiral model, Waterfall model, Evolutionary prototyping model, Reusable software model.

UNIT - II   **Software Engineering Methodologies**

Introduction, Components of Software Engineering, Software Development Models- Capability Maturity Model, Rapid Application Development model, Incremental model.

UNIT - III   **Predictive Versus Adaptive Approaches to SDLC**

Introduction, Traditional Predictive Approaches to SDLC, Adaptive Approaches to SDLC, Separation of Design and Construction, Unpredictability of Requirements.

UNIT - IV   **Agile Programming**

Introduction, Flavors of Agile Development, Agile Manifesto, Refactoring Techniques, Limitations of The Agile Process.

UNIT - V   Extreme Programming (XP)

Introduction, XP Equation, XP Values, Assuming Sufficiency- Sufficient time and resources, Constant change of cost, Developer effectiveness, Freedom to experiment. Extreme Programming Practices- Introduction, Coding Practices, Developer Practices, Business Practices.XP Tools- Introduction, JAVA and XP, Tools and Philosophies, Open source Toolkit.

REFERENCE BOOK:

1. "Fundamentals of Software Engineering" by Rajib Mall
2. "Software Engineering: A practitioner's approach" by Roger S Pressman
3. "Software Engineering" by Ian Sommerville
4. "Software Engineering" by Gaurav Gupta and Deepika Gupta

COURSE OUTCOME:

1. Learn how to test programming models
2. Learn how to write different test cases for any program to test input/output compellability.

1. Embedded Systems

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-402	Elective III (Embedded Systems)	100	60	21	40	14	3

COURSE OBJECTIVE:
1. An ability to design a system, component, or process to meet desired needs   within realistic constraints such as economic, environmental, social, political,   ethical, health and safety, manufacturability, and sustainability
2. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

Syllabus :
UNIT - I   Introduction of Embedded system

Embedded System, Complex Systems and Microprocessor, Categories of Embedded Systems, Operating Systems for Embedded Systems. Embedded System Design: Embedded System Design Process, Formalism for System Design

UNIT - II   Embedded Processors, Hardware Units and Devices

Processor in the system, Other Hardware Units and Devices in a System, Linking and Interfacing Buses and Units,

UNIT - III   8051 Architecture

8051 microcontroller, I/O Ports and Circuits, Timers / Counters, Serial Interface, Interrupts. 8051 Assembly Language Programming: Registers in the 8051, 8051 Assembly Language Programming, Assembling and Running an 8051 Program, The 8051 program Counter and ROM Space, 8051 Data types and Directives, 8051 Flag Bits and PSW Register, 8051 Register Banks and Stack.

UNIT - IV   8051 Instruction Set

Addressing modes in 8051, Types of instructions in 8051, Descriptions of 8051 Common Instructions.

UNIT - V   Interfacings with 8051

Interfacing with Keyboard, Interfacing with D/A and A/D Converter, Interfacing with LCD Display, Interfacing with Stepper Motor. Introduction to Real Time Operating Systems: A Brief History of Operating Systems, Meaning and Types of operating

system, Definition of RTOS, The Scheduler, Objects and Services, Key Characteristics of an RTOS.

REFERENCE BOOKS:

1. Katz David J and Gentile Rick, Embedded Media Processing, Elsevier/Newnes, 2006. (TK5102.9.K19)
2. Noergaard Tammy, Embedded Systems Architecture: A Comprehensive Guide for
3. Engineers and Programmers, Elsevier/Newnes, 2005. (TK7895.E42N769)
4. Wolf Wayne Hendrix, Computers as Components: Principles of Embedded
5. Computing System Design, 3rd Edition, Morgan Kaufmann, 2012.
6. Kuo Sen M and Gan Woon-Seng, Digital Signal Processors: Architectures,
7. Implementations and Applications, Pearson Prentice Hall, 2005 (TK5102.9.K96)

COURSE OUTCOME:
1. Understand the hardware and software components as well as their development cycles.
2. Understand the deployment of embedded processors and supporting devices in real-world applications, and
3. Interpret application specifications and make practical recommendations on resource selection for embedded systems.

MCA -402
Elective III
1. Next Generation Networks

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-402	Elective III (Next Generation Networks)	100	60	21	40	14	3

COURSE OBJECTIVE:
1. To study the evolving wireless technologies and standards
2. To understand the architectures of various access technologies such as 3G, 4G, WiFi etc.
3. To understand various protocols and services provided by next generation networks.

Syllabus :

UNIT - I   Mobile computing Basics

Basic history of Mobile Computing Architecture for mobile computing, Three tier architecture, design considerations for mobile computing, mobile computing through internet, Wireless network architecture, Applications, Security, Concerns and Standards, Benefits, Future. Evolution of mobile computing.

UNIT - II   Wireless network and technology
Overview of Wireless network and technologies introduction, different generations. Introduction to 1G, 2G, 3G and 4G, Bluetooth, Radio frequency identification(Rfid),Wireless Broadband, Mobile IP: Introduction, Advertisement, Registration, TCP connections, two level addressing, abstract mobility management model, performance issue, routing in mobile host, Adhoc networks, Mobile transport layer: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, transaction oriented TCP. ,IPv6

UNIT - III   GPRS and Applications
General packet radio service(GPRS) GPRS and packet data network, GPRS network architecture, GPRS network operation, data services in GPRS, Applications of GPRS, Billing and charging in GPRS.

UNIT - IV   Adhoc network system and protocols
Infrastructure and ad-hoc network System Architecture, Protocol Architecture, Medium Access Control layer, MAC Management, Wireless LAN advantages, IEEE 802.11a, 802.11b standards ,Wireless LAN architecture, Mobility in Wireless LAN, Deploying Wireless LAN, Mobile ad hoc networks and sensor networks, wireless LAN security

UNIT - V   Wireless Application Protocol (WAP)

Wireless Application Protocol(WAP), MMS, GPRS application CDMA and 3G Spread-spectrum Technology, FHSS, DSSS, CDMA versus GSM, Wireless data, third generation networks, applications in 3G Wireless LAN, WiFi v/s 3G Voice over Internet protocol and convergence

REFERENCE BOOK:

1. Mobile Computing , Asoke K Telukder, Roopa R Yavagal, TMH \
2. Mobile Communications, Jochen Schiller, Pearson
3. Wireless Communications and Networks, 3G and beyond, ITI Saha Misra, TMH.
4. Principle of wireless Networks by Kaveh Pahlavan and Prashant Krishnamurthy, Pearson 2002.

COURSE OUTCOME :
1.   Keep student updated on latest wireless technologies and trends in the communication field.
2.   Understand the transmission of voice and data through various networks.

MCA -402
Elective III
3. Network Security & Cryptography

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-402	Elective III (Network Security & Cryptography)	100	60	21	40	14	3

COURSE OBJECTIVE:
1. To understand basics of Cryptography and Network Security.
2. To be able to secure a message over insecure channel by various means.
3. To understand various protocols for network security to protect against the threats in the networks.

Syllabus :

UNIT - I   Introduction to Network security

Network security needs. Threats to network security, kind of computer security. security policies, security mechanisms, Attacks, security tools and Basic Cryptography, Transposition/Substitution, Block Cipher Principles.

UNIT - II   Symmetric crypto primitives

Introduction to Symmetric crypto primitives, Asymmetric crypto primitives, Secret Key Cryptography , Data Encryption Standard (DES), Message Digests, MD5, Message Authentication and Hash Functions, Hash And Mac Algorithms, RIPEMD , HMAC.

UNIT - III   Cryptosystems

Principles of Public Key Cryptosystems, Diffie Hellman Key Exchange , Elliptic Curve Cryptography, Cryptanalysis, SHA-1, RSA, Selection of public and private keys.

UNIT - IV   Electronic Mail Security and Firewalls

Threats to E-Mail, Requirements and Solutions – Confidentiality, Integrity; Encryption for Secure E-Mail; Secure E-Mail System – PGP (Pretty Good Privacy), S/MIME (Secure Multipurpose Internet Mail Extensions). Firewalls – Types – Packet Filtering Gateway,

Stateful Inspection Firewall, Application Proxy, Guard, Personal Firewalls; Comparison of Firewall Types; Firewall Configurations.

UNIT - V   Network Security

Network Concepts, Threats in Networks – Attacks on Networks, Threats in Transit: Eavesdropping and Wiretapping, Protocol Flaws, Impersonation; Network Security Controls – Architecture, Encryption, Virtual Private Networks, Public Key Infrastructure (PKI) and Certificates.

REFERENCE BOOKS:

1.   "Handbook of Applied Cryptography" by Alfred J Menezes and Scott A Vanstone. ...
2.   "Cryptography and Network Security: Principles and Practice" by William Stallings.
3.   " A Course in Number Theory and Cryptography" by Neal Koblitz.
4.   " Introduction to Cryptography" by Johannes A Buchmann.

COURSE OUTCOME :
1.   How to secure information on Internet.
2.   How to authenticate users on Internet.

MCA -402
Elective III
4.Mobile Application Development

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-402	Elective III (Mobile application Development)	100	60	21	40	14	3

COURSE OBJECTIVE:
1. Learning about mobile devices types
2. Learning about modern mobile operating systems
3. Learning about data transmission standards
4. Learning about systems for mobile application distribution
5. Preparing for mobile application development

Syllabus :

UNIT - I   Mobile Application Development Framework and Android

Mobile Application Development Framework: Types- Features- challenge. Android: Introduction – Architecture -Installation and configuration- ADE- APIs User Interfaces: Components-views-Layouts and its types- Menus and its types – Dialogues and its types - Notifications and its types

UNIT - II Data Storage

SQLite database- Files- shared preferences-Content Providers Location Based Services: Location Provider- Geo Coder- Map

UNIT - III   Multimedia and HTML

Audio- Video- Animations- Drawing. Phone Gap and HTML5: Phone Gap Introduction – Architecture- Installation and configuration, HTML5 Introduction

UNIT - IV   Data list control

Data list control- Validation feature -Application Cache in HTML

UNIT - V   Event Management

Events: Listener and its types-handler and its types. Geo location, Media, Storage

REFRENCE BOOKS:
1. "Mobile Application Development: JavaScript Frameworks" by Hazem Saleh and Ethan Holmes
2. Professional Android 4 Application Development" by Reto Meier
3. Beginning Mobile Application Development in the Cloud" by Richard Rodger
4. Mobile Communications Satellites: Theory and Applications" by Tom Logsdon

COURSE OUTCOME:
1. Explain the features and challenges of mobile devices, native app development frameworks, hybrid app development frameworks Understand
2. Apply the UI components, multimedia usage, location based services, data storage mechanisms for the given problem Apply
3. Apply HTML5 in UI design for the given problem Apply
4. Design an application based on the user requirements

Mobile application Development Lab

1. Introduce mobile technologies and devices
2. Understand Android platform and applications overview
3. Setting Android development environments
4. Writing Android applications
5. Understanding anatomy of an Android application
6. Managing application resources
7. Learn Essentials of Android user interface design

MCA -403
Elective IV
1. Virtualization & Cloud Computing

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-403	Elective IV (Virtualization & Cloud Computing)	100	60	21	40	14	3

COURSE OBJECTIVE :
1.   Learn how to reduce spending on technology infrastructure
2.   Understand to get more work done in less time with less people (Streamline processes).

Syllabus :

UNIT - I   Cloud computing and products

Components of a computing cloud, Differentiating types of clouds: public, private, hybrid, Delivering services from the cloud, Categorizing service types, Comparing vendor cloud products: Amazon, Google, Microsoft and others, Adopting the Cloud, Key drivers of cloud computing solutions.

UNIT - II   SaaS and various services

Handling sensitive data, Aspects of cloud security, Assessing governance solutions. Exploiting Software as a Service (SaaS), Characterizing SaaS, Streamlining administration with centralized installation, Optimizing cost and performance with scale on demand, Comparing service scenarios

UNIT - III   SaaS and web services

Inspecting SaaS technologies, Deploying web applications, Implementing web services: SOAP, REST, Choosing a development platform, Delivering Platform as a Service (PaaS)

UNIT - IV   Cloud storage and virtualization

Managing cloud storage, Controlling unstructured data in the cloud, Deploying relational databases in the cloud, Improving data availability, Enabling technologies

Scalable server clusters, Achieving transparency with platform virtualization, Comparing in-house facilities to the cloud, Estimating economic factors downstream, Selecting appropriate service-level agreements

UNIT - V   Migration of cloud

Migrating to the Cloud , Rearchitecting applications for the cloud, Integrating the cloud with existing applications, Avoiding vendor lock-in, Planning the migration and selecting a vendor.

REFERENCE BOOKS:
1.   " Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More" by Kris Jamsa.
2.   " Cloud Security: A Comprehensive Guide to Secure Cloud Computing" by Ronald L Krutz and Russell Dean Vines.
3.   " Cloud Computing" by Nayan B Ruparelia.

COURSE OUTCOME:
1.   Explain the core issues of cloud computing such as security, privacy, and interoperability.
2.   choose the appropriate technologies, algorithms, and approaches for the related issues. identify problems, and explain, analyze, and evaluate various cloud computing solutions.

MCA -403
Elective IV
2. Software Project Management

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-403	Elective IV (Software Project Management)	100	60	21	40	14	3

Course Objective :

This course is aimed at introducing the primary important concepts of project management related to managing software development projects. They will also get familiar with the different activities involved in Software Project Management. Further, they will also come to know how to successfully plan and implement a software project management activity, and to complete a specific project in time with the available budget.

Syllabus :

Unit -I: Product: The evolving role of software-industry perspective – aging software plant software competitiveness. Soft – characteristics – components –application – crisis on the HorizonSoftware myths. Process: Process-methods-tools-generic view of software Engineering – software process models-linear sequential model –proto typing model-RAD Model – incremental, spiral, component, assembly and concurrent development models.

Unit -II: Project Management concept: People – Product-Process-Project Software process and project metrics: Measures – Metrics and indicators-Software measurements-metrics for software quality-integrating metrics within the software process.

Unit -III: Software project planning: Planning objectives – software scope-resources software project estimation-Decomposition Techniques – Empirical estimation models-COCOMO modelautomated estimation tools. Risk managements: software risks-risk identification-risk mitigation, monitoring and management –safety risks and hazards-RMMM plan.

Unit -IV: Project scheduling and tracking: Basic concepts-relation between people and effort defining task set for the software project-selecting software engineering task-refinement of major taskdefining a task network-scheduling –project plan software quality assurance-

quality concepts-software concepts -software reviews-formal technical review –Formal approaches to SQA- software reliability –SQA plan –the ISO 9000 quality standards.

Unit -V: Software configuration management: baselines – software configuration item – the SCM process identification of objects in software configuration – version control – change control configuration audit – status reporting – SCM standards.

Text Book:
1. Walker Royce, Software Project management: A unified framework, Pearson Education
2. Pankaj Jalote., Software Project management in practice, Pearson Education
3. Kelkar, S.A., Software Project management: A concise study, PHI
4. Mike Cottorell and Bob Hughes, Software Project management –
5. Sommerville I, Software engineering - , Addison Wesley
6. Robert Futrell, Donald Shafer and Linda I Quality software project management, Person Education
7. Pressman, R.S., Software Engineering, McGraw Hill International

Course Outcome :

Identify the different project contexts and suggest an appropriate management strategy. Practice the role of professional ethics insuccessful software development. Identify and describe the key phases of project management. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

MCA -403
Elective IV
3. Mobile computing & Communication

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-403	Elective IV (Mobile computing & communication)	100	60	21	40	14	3

Course Objective :

• To provide an overview of Wireless Communication networks area and its applications in communication engineering.

- To appreciate the contribution of wireless Communication networks to overall technological growth.
- To explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in wireless Communication Networks.
- To enable students to compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.

Syllabus:

Unit 1: Introduction: Overview of Mobile and Wireless Technology, Evolution of Mobile communication, Examples of Wireless communication systems, Applications of Mobile and Wireless Technology. Cellular Systems: Introduction, Cell Area, Capacity of Cells, Channel allocation, Frequency reuse, Cochannel Interference, Cell Splitting, Cell Sectoring

Unit 2: Wireless transmission: Signals and Noise, Antennas. Multiplexing – SDM, FDM, TDM, CDM. Modulation – ASK, FSK, PSK, AFSK, APSK, Multicarrier modulation. Spread Spectrum – DHSS, FHSS. Wireless Medium Access Control: SDMA, FDMA, TDMA, Spread Spectrum Multiple Access – FHMA, CDMA, Hybrid spread spectrum techniques, GPRS, SMS. Packet Radio – Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CA, Reservation ALOHA, PRMA.Multi-hop Wireless.

Unit 3: Wireless Networking: Ad-hoc Networks, Wireless LANs and PANs – IEEE 802.11, HiperLAN, Bluetooth. Mobile Network Layer – Mobile IP, Routing in mobile networks. Mobile Transport Layer – Indirect TCP, Snooping TCP, Mobile TCP. Mobile Agent – Model, Architecture, Mobile DataBase, Mobile DataBase Management.

Unit 4: Wireless Systems & Standards: Telecommunication Systems – AMPS, GSM, DECT, TETRA, UMTS, IMT-2000. Satellite Systems – Types - GEO, LEO, MEO, GPS. WLL, MMDS, LMDS, WAP, WML.

Unit 5: Wireless Security Issues: Security threats to wireless networks, Open system authentication, Shared key authentication – WEP, Encryption Issues in Mobile Commerce.

Books Recommended:
1. Schiller J., "Mobile Communications", AW Publications, 2001.
2. Rapport T., "Wireless Communications – Principles and Practice", Pearson, 2/e, 2003.
3. Agrawal D. & Zeng Q., "Introduction to Wireless and Mobile Systems", Vikas Publishing House, 2003.
4. Blake R., "Wireless Communication Technology", Thomson Asia, 2001.

Course Outcome :

- Understand fundamentals of wireless communications.
- Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.
- Demonstrate basic skills for cellular networks design.
- Apply knowledge of TCP/IP extensions for mobile and wireless networking.

MCA -403
Elective IV
4. GIS & Remote Sensing

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-403	Elective IV (GIS & Remote Sensing)	100	60	21	40	14	3

COURSE OBJECTIVE:
1. To provide exposure to students in gaining knowledge on concepts and applications leading to modeling of earth resources management using Remote Sensing.
2. To acquire skills in storing, managing digital data for planning and development.
3. To acquire skills in advance techniques such as hyper spectral, thermal and LiDAR scanning for mapping, modeling and monitoring.

Syllabus :

UNIT - I   Geographical Information System

Introduction, Definitions, Basic Concepts, history and evolution, Components, Need, Scope, interdisciplinary relations, applications areas, and overview of GIS. GIS data: spatial and non-spatial, spatial data model: raster, vector, Topology and topological models; Spatial referencing using coordinates and geographic identifiers, metadata; Spatial data acquisition; Attribute data sources; Spatial and attribute data input; overlay, buffering, spatial join and query, connectivity, network functions, watershed analysis, view-shed analysis, spatial pattern analysis, spatial autocorrelation, trend surface analysis; GIS presentation functions: data visualization methods, exporting data; Modern trends: Internet GIS, 3DGIS.

UNIT - II   Basic Spatial Analysis, Integration and Modelling

Logic operations, general arithmetic operations, general statistical operations, geometric operations, query and report generation from attribute data, geometric data search and retrieval, complex operations of attribute data, classification reclassification, integrated geometry and attributes, overlay, buffer zones, raster data overlay, integrated data analysis.

UNIT - III   Web GIS

Definition, concept of Web GIS, History of web GIS, components of web GIS, internet, web GIS v/s Internet GIS, Fundamentals of computer networking – network environment – network communication models –protocols – TCP/IP. Applications of web GIS, users and stake holders of web GIS, advantages and limitations of web GIS, Participatory GIS -Web-based GIS For Collaborative Planning And Public Participation, Digital Democracy for planning, web GIS An Aid To Local Environmental Decision making, web GIS for regional and local level planning. Community GIS, Internet GIS Applications in intelligent transportation systems, planning and resource management.

UNIT - IV   Photogrammetry

Definition and terms, history of photogrammetry, concepts, principles and types of photogrammetry, types of aerial photographs vertical photographs, tilted photographs, orthophotographs, aerial cameras, geometry and scale orientation and measurements, distortions, displacements and their corrections, rectification and orthophotographs,

UNIT - V   Basic Principles of Remote Sensing

Physics of remote sensing, Characteristics of electro-magnetic radiation; Interactions between matter and electro-magnetic radiation; energy interaction in the atmosphere; energy interactions with the earth's surfacespectral reflectance curves. Types of remote sensing with respect to wavelength regions; active and passive remote sensing, Sensor types characteristics: imaging systems, photographic sensors, characteristics of optical sensors;

BOOKS:

1. Principal of GIS for Land Resources Assessment P.A.Vurrough
2. GIS Principal Vol-1 Goodchild 7
3. Zhong- Ren Peng, Ming-Hsiang Tsou, (2003) Internet GIS: Distributed Geographic
4. Information Services for the Internet and Wireless Networks, Wiley.
5. Concepts and Techniques of Geographic Information Systems, CP Lo Albert K W Yeung, 2005 Prantice Hall of India.
6. Principles of GIS for Land Resources Assessment by P.A.Burrough, Oxford: Science publications, 1986.
7. Geographic Information Systems – An introduction by Tor Bernhardsen, John Wiley and Sons, Inc., New York, 2002.
8. GIS – A computing Perspective by Micheal F. Worboys, Taylor & Francis, 1995.

COURSE OUTCOME :
1. Fully equipped with concepts, methodologies and applications of Remote Sensing Technology.
2. Prepare the candidates for National and Global Employability
3. Acquire skills in handling instruments, tools, techniques and modeling while using Remote Sensing Technology

MCA -404
Dissertation

Subject Code	Subject Name & Title	Total Marks	End Semester Exam Marks		Sessional Marks		Total Credits
			Max	Min	Max	Min	
MCA-404	Dissertation	500	300	105	200	70	10

* Project work should be undertaken in an organization engaged in software/hardware development for 4-6 weeks. Synopsis of project should be approved by HOD of concerned Institution within one month from the beginning of the project. A confidential report of the student should be taken from the project guide and should be made part of Internal Marks .