।। सा विद्या या विमुक्तये ।।
स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
"ज्ञानतीर्थ" परिसर, विष्णुपूरी, नांदेड - ४३१६०६ (महाराष्ट्र)
SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)
Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade
ACADEMIC (1-BOARD OF STUDIES) SECTION
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प्रस्तुत विद्यापीठीय संकुलातील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर स्तरावरील द्वितीय वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०—२१ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक २० जून २०२० रोजी संपन्न झालेल्या ४७व्या मा. विद्या परिषद बैठकीतील विषय क्र.११/४७—२०२०** च्या ठरावानुसार **प्रस्तुत विद्यापीठीय संकुलातील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर स्तरावरील द्वितीय वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०—२१ पासून लागू करण्यात येत आहेत.

01. M.Sc.-II Year-Botany
02. M.Sc.-II Year-Analytical Chemistry
03. M.Sc.-II Year-Industrial Chemistry
04. M.Sc.-II Year-Medicinal Chemistry
05. M.Sc.-II Year-Organic Chemistry
06. M.Sc.-II Year-Physical Chemistry
07. M.Sc.-II Year-Polymer Chemistry
08. M.Sc.-II Year-Computer Application
09. M.Sc.-II Year-Computer Network
10. M.Sc.-II Year-Computer Science
11. M.C.A.-II Year (Master of Computer Applications)
12. M.Sc.-II Year-Environmental Science
13. M.A./M.Sc.-II Year-Geography
14. M.Sc.-II Year-Geophysics
15. M.Sc.-II Year-Geology
16. M.A./M.Sc.-II Year-Mathematics
17. M.Sc.-II Year-Microbiology
18. M.Sc.-II Year-Physics
19. M.Sc.-II Year-Zoology
20. M.Sc.-II Year-Biotechnology
21. M.A./M.Sc.-II Year-Statistics

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.: शैक्षणिक—१/परिपत्रक/पदव्युत्तर(संकुल)—सीबीसीएस अभ्यासक्रम/२०२०—२१/**५१३**

स्वाक्षरित/—
उपकुलसचिव
शैक्षणिक (१—अभ्यासमंडळ) विभाग

दिनांक : ०८.०८.२०२०.

प्रत माहिती व पुढील कार्यवाहीस्तव :
१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) मा. संचालक, सर्व संबंधित संकुले, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

(NAAC Re-accredited with 'A' Grade)

School of Computational Sciences

CURRICULUM FRAMEWORK AND SYLLABUS

M.C.A. SECOND YEAR (w.e.f. 2020-2021)*

Program Code: SCS-S-MCA-PG (13-2-4-01) (For Campus Reference only)

*(BoS deserves the rights for minor corrections, typographical errors in this syllabus with due approval of Administrations)

Program Educational Objectives (PEO)

Post graduates of MCA program will be

PEO1: Utilizing strong technical aptitude and domain knowledge to develop smart software solutions for the upliftment of society.

PEO2: Applying research and entrepreneurial skills augmented with a rich set of communication, teamwork and leadership skills to excel in their profession.

PEO3: Showing continuous improvement in their professional career through life-long learning, appreciating human values and ethics.

Graduate Attributes for MCA Program (GA)

1. Computational Knowledge:

Apply domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

2. Problem Analysis:

Identify, formulate, research literature, and solve *complex* computing problems reaching substantiated conclusions using fundamental principles of computing sciences.

3. Design /Development of Solutions:

Design and evaluate solutions for *complex* computing problems that meet specified needs with appropriate consideration for cultural, societal, and environmental considerations.

4. Conduct Investigations of Complex Computing Problems:

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern Tool Usage:

Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to *complex* computing activities, with an understanding of the limitations.

6. Professional Ethics:

Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

7. Life-long Learning:

Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

8. Project management and finance:

Demonstrate knowledge and understanding of the computing and management principles and apply these to one**'**s own work, to manage projects and in multidisciplinary environments.

9. Communication Efficacy:

Communicate effectively with the computing community, and with society at large, about *complex* computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

10. Societal and Environmental Concern:

Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

11. Individual and Team Work:

Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

12. Innovation and Entrepreneurship

Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

Program Outcomes (PO) for Master of Computer Applications

On completion of MCA program, the students are expected to

PO1: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

PO2: Identify, formulate, research literature, and solve complex computing problem searching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

PO3: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

PO6: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

PO7: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

PO8: Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO9: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

PO10: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

PO11: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

PO12: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

PEO-PO Mapping:

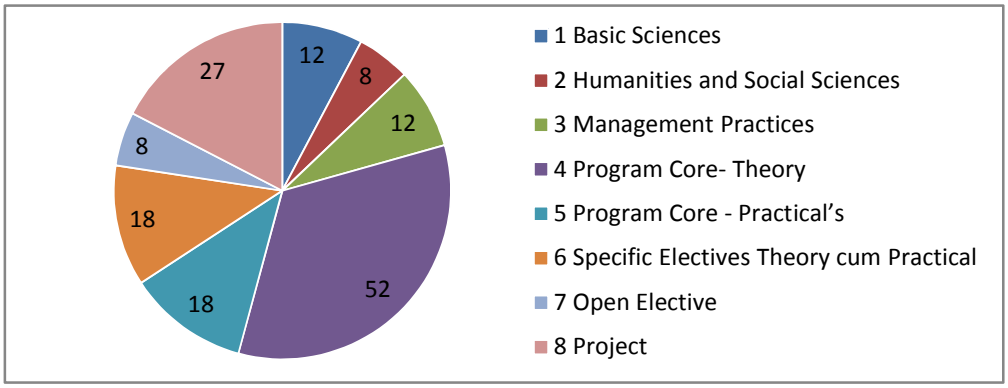
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1												
PEO2												
PEO3												

PO-GA MAPPING:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
PO1												
PO2												
PO3												
PO4												
PO5												
PO6												
PO7												
PO8												
PO9												
PO10												
PO11												
PO12												

Credit Distribution:

Sr. No.	Category of courses	Credits	Percentage of Credits to Total Credits
1	Basic Sciences	12	7.74%
2	Humanities and Social Sciences	08	5.16%
3	Management Practices	12	7.74%
3	Program Core- Theory	52	33.55%
4	Program Core - Practical's	18	11.61%
5	Specific Electives Theory cum Practical	18	11.61%
5	Open Elective	08	5.16%
6	Project	27	17.42%
	Total Credits	155	**100%**



Basic Science (BS) & Humanities & Social Sciences Courses:

Semester	Name of the Course	Category	Credits
1	Mathematical Foundations	BS	4
2	Probability & Statistics	BS	4
3	Graph Theory	BS	4
		BS Total Credits	**12**
1	Programming Logic	HSS	4
2	Oral & Written Communication Skills	HSS	4
		HSS Total Credits	**8**

Program Core, Elective & Practical Courses:

Semester	No. of Core Theory Courses	Credits	No. of Core Practical Courses	Credits	No. of Specific Elective Courses	Credits	No. of Open Elective Courses	Credits	Total Credits
I	05	20	02	04	-	-	01	02	26
II	05	20	02	04	-	-	01	02	26
III	05	20	02	04	-	-	01	02	26
IV	03	12	02	04	02	08	01	02	26
V	03	12	03	06	02	08	-	-	26
VI	Major Project								25
								Total Credits	**155**

I to V	**Total Credits for Core Courses**	84	**Total Credits for Practical Courses**	22	**Total Credits for Specific Elective Courses**	16	**Total Credits for Open Elective Courses**	08	130
VI	**Major Project**								25
								Total Credits	**155**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
SCHOOL OF COMPUTATIONAL SCIENCES

Scheduling of Courses

Semester	Theory					Practical			Credits
I	MCA 101 Programming Logic	MCA 102 Data Structure using C	MCA 103 Computer Organization & Architecture	MCA 104 Introduction to Mgt. Functions	MCA 105 Mathematical Foundation	MCA 106 Lab-1 C Programming.	MCA 107 Lab-2 COA	MCA 108 Open Elective	26
II	MCA 201 SAD	MCA 202 DA A using C++	MCA 203 Management Information System	MCA 204 Prob. & Stat.	MCA 205 Oral & Written Comm. Skills	MCA 206 Lab-3 SAD	MCA 207 Lab-4 C++ Programming.	MCA 208 Open Elective	26
III	MCA 301 Software Engineering	MCA 302 Visual Programming Tools.	MCA 303 Data Communications & Computer Networks	MCA 304 Relational Database Management System	MCA 305 Graph Theory	MCA 306 Lab-5 Visual Programming Tools.	MCA 307 Lab-6 RDBMS	MCA 308 Open Elective	26
IV	MCA 401 Compiler Designing	MCA 402 Java Programming.	MCA 403 Operating Systems	MCA 404 Elective-1	MCA 405 Elective-2	MCA 406 Lab-7 Java Programming.	MCA 407 Lab-8 Lunux OS	MCA 408 Open Elective	26
V	MCA 501 Cryptography & Net. Sec.	MCA 502 Data Mining & DW	MCA 503 Theory of Computation	MCA 504 Elective-3	MCA 505 Elective-4	MCA 506 Lab-9 DM & DW	MCA 507 Lab-10 Elective-4	MCA 508 Mini Project	26
VI	MCA 601: Project Development								25
	Synopsis Submission	Progress Report-1 System Analysis	Progress Report-2 Designing & Scheduling	Progress Report-3 Coding and modeling	Progress Report-4 Testing & Implementation	Project Dissertation Documentation	Via voice Project Presentation		
								Total Credits	155

MCA -Second Year [Third Semester]

Code No.	Title	Internal Credits	External Credits	Total Credits
MCA-301	Software Engineering	02	02	04
MCA-302	Visual Programming Tools	02	02	04
MCA-303	Data Communications and Computer Networks	02	02	04
MCA-304	Relational Database Management System	02	02	04
MCA-305	Graph Theory	02	02	04
MCA-306	Lab-5 : Visual Programming Tools	01	01	02
MCA-307	Lab-6 : Relational Database Management System	01	01	02
MCA-308	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School / Open Elective - Professional Practices	02	00	02
	Total Credits	14	12	26

MCA -Second Year [Fourth Semester]

Code No.	Title	Internal Credits	External Credits	Total Credits
MCA-401	Compiler Designing	02	02	04
MCA-402	Java Programming	02	02	04
MCA-403	Operating System Concepts	02	02	04
MCA-404	Elective -1 a) Software Project Management b) Software Testing Tools c) Accounting and Management Control d) Enterprise Resource Planning and DSS	02	02	04
MCA-405	Elective-2 a) Optimization Techniques b) Statistical Computing c) Cyber Law and Security d) Information Security	02	02	04
MCA-406	Lab-7 : Java Programming	01	01	02
MCA-407	Lab -8 : Linux Operating System	01	01	02
MCA-408	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School / In house Open Elective – Seminar Presentation Activity	02	00	02
	Total Credits	14	12	26

Notes

1. For Theory, 04 credits means 02 internal credits and 02 external credits
2. For Practical, 02 credits means 01 internal and 01 external credits
3. For Mini Project Development Activity, 02 credits are purely internal
4. For Major Project Development Activity, 12 Internal and 13 External Credits
5. For Open electives, 02 credits are purely internal credits
6. Student has to earn at least 02 credits in any semester from the interdisciplinary open elective course offered by other school.
7. Internal Assessment evaluation pattern will differ from subject to subject and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern
8. External Assessment Examination will be conducted for maximum marks of 50 marks for the award of end semester examination marks

Code:	MCA 301	Software Engineering	Credits: 04
Course Objectives:			
To explain the basic terminologies and implement systems effectively using various system models. To comprehend the testing Process and software evolution in order to meet dynamic changing requirements. To develop understanding of advanced concepts and methods required for construction of large software systems. To apply project management strategies for effective software development.			
Course Outcome:			
CO1: Explain a process model for a software project Development. CO2: Prepare the SRS, Design document, Project plan of a given software system CO3: Apply Project Management and Requirement analysis, Principles to S/W project development. CO4: Analyze the cost estimate and problem complexity using various estimation techniques CO5: Generate test cases using the techniques involved in selecting: Analyze(a) White Box testing (b) Block Box testing CO6: Explain the advantages of configuration management and risk management activities.			
Unit-1:	Software, Software Engineering, and Process		
The nature of Software, The unique nature of WebApps, Software engineering-A layered technology, General principles of software engineering practice, Software myths, Agile development: What is an Agile Process?, Capability Maturity Model Integration (CMMI).			
Unit-2:	Process Models, Software Requirements & System Modeling		
A Generic process model (framework), Process assessment and improvement, Prescriptive process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process, Functional and Non-functional requirements; User requirements; The software requirements document, Requirements Engineering Processes: Requirements elicitation and analysis; Requirements validation; Requirements management, Context models; Behavioral models; Data models; Object models; Structured Methods.			
Unit-3:	Design concepts & Architectural Design		
Design Concepts, Architectural design decisions; System organization; Modular decomposition styles;			
Unit-4:	Object-Oriented design		
Objects and Object Classes; An Object-Oriented design process; Design Evolution			
Unit-5:	Verification and Validation & Software testing		
Planning verification and validation; Software inspections; automated static analysis; Verification and formal methods. System testing; Component testing; Test case design; Test automation, Quality management: Software Quality Assurance.			
Unit-6:	Project Management & Software Cost Estimation		

Management activities; Project planning; Project scheduling; Risk management. Software Productivity; Estimation techniques; The COCOMO II Model, Project duration and staffing.	
Text Books:	
1.	Roger S. Pressman. Software Engineering -A Practitioners approach. McGraw-Hill, 2007, 7thEd.
2.	Ian Sommerville. Software Engineering. Pearson Education Publications, 2007,8thEd.
Reference Books	
1.	Shari Lawrence Pfleeger, Joanne M. Atlee. Software Engineering Theory and Practice. Pearson Education, 2006, 3rdEd.
2.	Waman S Jawadekar. Software Engineering Principles and Practice, Tata McGraw Hill, 2004

Mapping with Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	M	-	M	M	S	L	L	M	S	L	L	-
CO2	L	-	L	M	M	L	L	M	M	-	M	L
CO3	L	L	S	M	M	L	L	L	S	L	L	L
CO4	M	-	M	L	M	M	L	S	L	L	L	M

S-Strong; M-Medium; L-Low

Code:	MCA-302	Visual Programming Tools	Credits: 04
Course Objectives:			
Design and Develop professional console and window based .NET application. Construct classes, methods and assessors and instantiate objects. Create and manipulate GUI components in VB. Design and Implement database connectivity using ADO.NET in window based application. Identify industry defined problem and suggesting solution(s) using .NET applications			
Course Outcome:			
Upon completion of this course, the student will be able apply technical knowledge and perform specific technical skills, including design web applications using ASP.NET.			
CO1: This course will cover the practical aspects of multi-tier application development using the .NET framework. CO2: This course is to introduce the basics of distributed application development. CO3: Technologies covered include the Common Language Runtime (CLR), .NET framework classes, VB, ASP.NET, and ADO.NET. CO4: It cover service oriented architecture, design, performance, security, content managements and deployment issues building multi-tier applications.			
Unit-1:	**Web Components**		
Introduction to Internet, Web Client/Server Model, Protocols for Web Client/Server Communication, Understanding Web Server IIS.			
Unit-2:	**Introduction to ASP.NET**		
DOT NET Framework, CLR, Framework Class Library, Garbage Collection, MSIL, Web Services, COM+ Component Services, Intro to ASP.NET, ASP.NET and HTML Controls, ASP.NET Events and Events Handler.			
Unit-3:	**Web Programming with VB.**		
Data Types, Variables, Expressions, Flow Control, Operators, Conditional Statements, Looping Structures, Arrays, OOP Concepts, Objects, Properties, Methods, Classes, Scope, Events			
Unit-4:	**Essentials ASP.NET**		
Working with Web forms, Directory Structure in ASP.NET, ASP.NET Compilation Model, Code behind Model, Working with Web form Controls, Navigation Controls, Validation Controls, Validation Groups, Client/Server Side Validation.			
Unit-5:	**ASP.NET Master Page**		
ASP.NET Master Page Overview, Master Page Layout with CSS, Master Page Directive and Content Place Holder, Creating and Applying Themes, Cookies, ASP.NET Session State, Application State			
Unit-6:	**Data Access with ADO.NET**		
Working with ADO.NET, Overview of ADO.NET Objects, Working with Connection Object, Command Object, Data Adapter Object, Data Set Object, Data Reader Object, Data Table Object.			
Text Books:			
1.	ASP.NET3.5 in C# and VB- Bill Evjen, S. Hanselman, Devin Rader, Wrox Publication		
2.	Ado.Net: The Complete Reference- Michael Otey, Tata McGraw-Hill Education		
3.	ASP.net – The Complete Reference- Matthew MacDonald, Tata McGraw Hill		

Reference Books	
1.	ASP.NET and VB.NET Web Programming - Coruch Matt J, Addison Wesley.
2.	Beginning ASP.NET - John Wiley and Sons, Wrox Publication.
3.	ASP.NET in C# and VB- Bill Evjen, S. Hanselman, Devin Rader, Wrox Publication

Mapping with Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	S	S	S	-	M	L	M	S	S	-		-
CO2	S	S	S	M	M	L	M	M	S	-	-	-
CO3	S	S	S	M	M	L	L	M	S	-	-	-
CO4	S	S	S	M	M	L	L	M	S	-	-	-

S- Strong; M-Medium; L-Low

Code:	MCA-303	Data Communications & Computer Networks	Credits: 04
Course Overview			
At the end of the course, students will be able to understand basic computer network technology. Understand and explain various components of computer networks. Identify the different types of network topologies and protocols. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. Identify the different types of network devices and their functions within a network. Understand and build the skills of routing mechanisms.			
Course Outcome			
CO1: Describe the building blocks of Computer Networks CO2: Explain the functionalities and protocols of various layers in ISO/OSI Network model. CO3: Implement a suitable routing strategies for a given network CO4: Use suitable transport/application layer protocol based on application requirements CO5: Suggest appropriate access control, congestion control and congestion avoidance technique for a given traffic scenario CO6: Examine performance analysis for a network using tools like NS2, wire shark			
Unit-1:	**Fundamentals and Link layer**		
Building a network – Requirements – Layering and protocols – Internet Architecture – Network software – Performance ; Link layer Services – Framing – Error Detection – Flow control			
Unit-2:	**Medium Access Control**		
Media access control – Ethernet (802.3) – Wireless LANs – 802.11 – Bluetooth – Switching and bridging			
Unit-3:	**Routing**		
Routing (RIP, OSPF, metrics) – Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP)Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing			
Unit-4:	**Transport layer**		
Overview of Transport layer – UDP – Reliable byte stream (TCP) – Connection management – Flow control – Retransmission – TCP Congestion control – Congestion avoidance (DECbit, RED) – QoS – Application requirements			
Unit-5:	**Traditional Applications**		
Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP			
Unit-6:	**Socket Programming**		
TCP and UDP socket programming , Client server paradigm			
Text Books:			
1.	Andrew S. Tanenbaum, "Computer Networks", 4th ed., Prentice Hall, 2003.		
2.	Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.		
Reference Books			

1.	William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
2.	James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	L	M	L	L	M							
CO2	L	M	L	L	M							
CO3	S	S	S	L	S			L				
CO4	S	S	S	L	S			L				
CO5	S	S	S	S	S			L				
CO6	S	S	S	S	S			L				

S- Strong; M-Medium; L-Low

Code: MCA 304	Relational Data Base Management System	Credits: 04
Course Objectives : 1. To understand the features of Relational database. 2. To describe data models and schemas in DBMS. 3. To use SQL- the standard language of relational databases for database operations. 4. To understand the functional dependencies and design of the databases.		
Course Outcome :		
CO1: To study the basic concepts of relational databases CO2: Learn and practice data modeling using the entity-relationship and developing database designs. CO3: Understand the use of Structured Query Language (SQL) and learn SQL syntax for writing queries. CO4: Apply normalization techniques to normalize the databases.		
Unit-1:	**Introduction Database Concepts**	
Introduction, characteristics of databases, components of databases, users of database system, DBMS system architectures, database administrator.		
Unit-2:	**Entity–Relationship Data Model**	
Introduction, benefits of data modeling, types of models, phases of database modeling, the Entity-Relationship (ER) Model, generalization, specialization and aggregation, Extended Entity-Relationship (EER) Model, keys and relationships issues.		
Unit-3:	**Relational Model and Algebra**	
Introduction, mapping the ER and EER Model to the Relational Model, data manipulation, advantages of the relational model, relational algebra, relational algebra queries, relational calculus.		
Unit-4:	**Structured Query Language (SQL)**	
Overview of SQL, data definition commands, set operations, aggregate function, null values, data manipulation commands, data control commands, views in SQL, nested and complex queries.		
Unit-5:	**Integrity and Security in Database**	
Domain constraints, referential integrity, assertions, trigger, security policies and authorization in SQL		
Unit-6:	**Relational–Database Design**	
Design guidelines for relational schema, function dependencies, Normal Forms- 1NF, 2 NF, 3NF, BCNF ,4NF, 5NF		
Text Books:		
1.	An Introduction to Database System, Bipin Desai, Galgotia Publications	
Reference Books		
1.	Database System Concepts, Korth, Slberchatz,Sudarshan, 6th Edition, McGraw Hill Publications	
2.	Fundamentals of Database Systems,Elmasri and Navathe, 5thEdition, PEARSON Education.	
3.	Database Management Systems,Raghu Ramkrishnan and Johannes Gehrke,TMH	
4.	Ivan Bayross, SQL-PLSQL, BPB Publications	

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	-	S	-	-	S	-	L	-	-	S	-
CO2	S	-	M	-	S	-	L	M	-	-	-	-
CO3	L	-	-	-	L	-	-	-	-	-	M	M
CO4	S	-	-	-	-	-	-	-	-	-	L	L
CO5	S	-	-	-	-	-	-	-	-	-	M	M

S- Strong; M-Medium; L-Low

Code:	MCA-305	Graph Theory	Credits: 04
Course Objectives:			
1. To understand and apply the fundamental concepts in graph theory 2. To apply graph theory based tools in solving practical problems 3. To improve the proof writing skills.			
Course Outcome:			
The students will be able to apply principles and concepts of graph theory in practical situations			
CO1: Use the discrete methods in subsequent courses in the design and analysis of algorithms, computability theory, and software engineering and computer systems. CO2: Reason mathematically about basic data types and structures used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones; synthesize elementary proofs, especially proofs by induction. CO3: Demonstrate an appreciation for the power of mathematics, Create mathematical models for variety of problems CO4: Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups. CO5: Be aware of a class of functions which transform a finite set in to another finite set which relates to input output functions in computer science. CO6: Demonstrate the capacity to engage in logical thinking and Critically read technical information. Define, evaluate and perform operations on functions.			
Unit-1:	**Unit Name**		
Preliminaries: Graphs, isomorphism, sub-graphs, matrix representations, degree, operations on graphs, degree sequences Connected graphs and shortest paths: Walks, trails, paths, connected graphs, distance, cut-vertices, cut-edges, blocks, connectivity, weighted graphs, shortest path algorithms			
Unit-2:	**Unit Name**		
Trees: Characterizations, number of trees, minimum spanning trees Special classes of graphs: Bipartite graphs, line graphs, chordal graphs			
Unit-3:	**Unit Name**		
Eulerian graphs: Characterization, Fleury's algorithm, chinese-postman-problem Hamilton graphs: Necessary conditions and sufficient conditions			
Unit-4:	**Unit Name**		
Independent sets, coverings, matchings: Basic equations, matchings in bipartite graphs, perfect matchings, greedy and approximation algorithms Vertex colorings: Chromatic number and cliques, greedy coloring algorithm, coloring of chordal graphs, Brook's theorem			
Unit-5:	**Unit Name**		
Edge colorings: Gupta-Vizing theorem, Class-1 graphs and class-2 graphs, equitable edge-coloring			
Unit-6:	**Unit Name**		
Planar graphs: Basic concepts, Eulers formula, polyhedrons and planar graphs, characterizations, planarity testing, 5-color-theorem Directed graphs: Out-degree, in-degree,			

connectivity, orientation, Eulerian directed graphs, Hamilton directed graphs, tournaments	
Text Books:	
1.	J.A.Bondy and U.S.R.Murty: Graph Theory and Applications (Freely downloadable from Bondy's website; Google-Bondy)
2.	D.B.West: Introduction to Graph Theory,Prentice-Hall of India/Pearson, 2009 (latest impression)
Reference Books	
1.	R.Diestel: Graph Theory,Springer(low price edition) 2000.
2.	Graph Theory with Applications to Engineering and Computer Science,byNarsingDeo,PHI(1979)

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	S	S	-	-	-	M	-	-	-	M	M	S
CO2	S	S	-	-	-	M	-	-	-	M	M	S
CO3	S	S	-	-	-	M	-	-	-	M	M	S
CO4	S	S	-	-	-	M	-	-	-	M	M	S
CO5	S	S	-	-	-	M	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

Code:	MCA 306	Lab-5 Visual Programming Tools	Credits: 02

Course Objectives:

This course will cover the practical aspects of multi-tier application development using the .NET framework. This course is to introduce the basics of distributed application development. Technologies covered include the Common Language Runtime (CLR), .NET framework classes, VB, ASP.NET, and ADO.NET. It also cover service oriented architecture, design, performance, security, content managements and deployment issues building multi-tier applications.

Course Outcome:

Upon completion of this course, the student will be able to develop static and dynamic web pages and perform specific technical skills, including design web applications using ASP.NET.

CO1: Design, document, code and test small VB console and GUI applications.
CO2:Design, document, code and unit test class libraries as part of a larger projects
CO3: Use an object browser and .NET documentation to examine VB and the .NET framework namespace contents.
CO4:Use the Visual Studio IDE to create and debug application and class library solutions and projects

List of Experiments

1. Simple application using web controls a) Finding factorial Value b) Money Conversion c) Quadratic Equation d) Temperature Conversion e) Login control
2. States of ASP.NET Pages
3. Ad-rotator Control
4. Calendar control a) Display messages in a calendar control b) Display vacation in a calendar control c) Selected day in a calendar control using style d) Difference between two calendar dates
5. Tree-view control a) Tree-view control and data-list b) Tree-view operations
6. Validation controls
7. Query textbox and Displaying records
8. Display records by using database
9. Data-list link control
10. Data-binding using drop-down-list control
11. Inserting record into a database
12. Deleting record into a database
13. Data-binding using data-list control
14. Data-list control templates
15. Data-binding using data-grid
16. Data-grid control template
17. Data-grid hyperlink
18. Data-grid button column
19. Data-list event
20. Data-grid paging
21. Creating own table format using data-grid

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	-	-	-	M	-	-	-	M	M	S
CO2	S	S	-	-	-	M	-	-	-	M	M	S
CO3	S	S	-	-	-	M	-	-	-	M	M	S
CO4	S	S	-	-	-	M	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

Code:	MCA 307- Lab-6	RDBMS	Credits: 02

Course Objectives:

This course aims at giving adequate exposure to students on the Database design and E-R modelling. The course also facilitates students with hands on training on SQL and programming language extension to SQL within the RDBMS environment.

Course Outcome:

CO1: Model Entity Relationship with E-R diagrams
CO2: Design database schema considering normalization and relationships within database
CO3: Write SQL queries to user specifications
CO4: Develop triggers, procedures, user defined functions and design accurate and PLSQL programs in Oracle and DB2.
CO5: Use the database from a front end application
CO6: Prepare technical report on the observations of the experiments

List of Experiments

1. Basic SQL – DDL & DML, Views, Group operations, aggregate operations, System operations in Oracle
2. Intermediate SQL –Joins, Subqueries, DCL operations
3. Advanced SQL – Nested tables, V-arrays
4. ER Modeling
5. Database Design and Normalization
6. Stored procedures and using them in a client application
7. Triggers and their front end application
8. DBA mechanisms – Installation, Backup and recovery operations, Batch processing

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	-	-	-	M	-	-	-	M	M	S
CO2	S	S	-	-	-	M	-	-	-	M	M	S
CO3	S	S	-	-	-	M	-	-	-	M	M	S
CO4	S	S	-	-	-	M	-	-	-	M	M	S
CO5	S	M	L	-	-	M	-	-	-	-	-	-
CO6	-	S	L	-	-	M	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

Code:	MCA 308	Professional Practices	Credits: 02

Course Objectives:

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Course Outcome:

Student will be able to: Acquire information from different sources, Prepare notes for given topic., Present given topic in a seminar., Interact with peers to share thoughts., Prepare a report on industrial visit, expert lecture.

Unit-1: Guest Lectures: (Any Two)

Guest lectures by industry experts, other professional are to be arranged from the following topics or any other suitable technical area. The brief report is to be submitted by individual student as part of term work.

1. 3-D animation techniques. 2. Stress management. 3. IT Act 2008. 4. Linux installation and administration. 5. Resume writing and preparation of C.V. 6. Introduction of "Python" programming language. 7. Career opportunities in IT industry. 8. Plastic Memory 9. Psychological Personality Development. 10. Managing emotional quotient 11. Internet Marketing. 12. Any Other Relevant Topic.

Unit-2: Information Search: (Any Two)

Form a group of 2 students. Information should be collected from various resources like Internet, books, journals etc. on the following allocated topics or any other suitable topic suggested by guide.

Prepare Individual technical report on selected topics of 8-10 pages and deliver seminar on at least one topic.

1. Android O.S. of mobile systems. 2. Autonomic computing to manage complexity of network components. 3. Cloud computing application (any one). 4. Biometrics – in secure E-transactions. 5. Pervasive Computing 6.E–MINE: A novel web mining approach 7. 5G wireless systems 7.Jini – advanced set of network protocols 8.Parasitic Computing 9.E – wallet 10.Any other relevant topic.

Unit-3: Group Discussion: (Any One)

Form a group of 5 students and write a brief report on selected topic as a part of term work.

Some of the suggested topics: 1.Role of UN in peace keeping 2.Effect of cinema on youth 3.Government contribution to IT 4.Balance between professionalism and family 5.Position of women India compare to other nations. 6. Present state of Indian Cricket Team 7.Is globalization really necessary? 8. Is India growing spiritually? 9. Any other suitable topic.

Unit-4: Mini Projects:

A group of 6to8 students be formed for group discussion; 1. Prepare a report on Computerization of Lab or Office 2. E-learning Open source Application installation and demonstration to educational institution.3. Any other relevant topics.

Unit-5: Prepare Yourself : (Any Two)

Preparation towards Interview. Write a brief report on selected topic as a part of term work.

1. Mock Interview 2.Mock aptitude test and puzzle solving. (Attach answer paper) 3.CV Preparation.(Attach CV). 4. Any other relevant activity.

Unit-6:	Social Contribution:
Socially Relevant activities Conduct any one activity through active participation of students and write the report Group of students – maximum 4 Report – not more than 6 pages List of suggested activities – (Activity may be thought in terms of campus improvement) i) Go green movement ii) Literacy camps iii) Building ethical and moral values iv) Conservation of electrical energy v) Water conservation vi) Clean campus / city vii) Awareness to avoid use of plastic carry bags viii) Educating students / people about fire fighting equipment ix) Rain water harvesting x) Traffic management within campus / city.	
Reference Books	
1.	Books on personality development and soft skills.
2.	Engineering Subjects Reference books.
3.	Journals and Magazines –IEEE journals, IT Technologies, PC Quest, Linux for You, CSI, Computer Today etc.
4.	Local News Paper. 5.Books on General Knowledge, Aptitude Test, Puzzle Solving by – R .S. Agarwal, Shakuntala Devi
5.	Websites - www.groupdiscussion.com - www. Seminarprojects.com

Code:	MCA 308	Open Elective	Credits: 02
Course Objectives:			
University Recognized MOOC (NPTEL/ SWAYAM/ Others) OR Intra/Inter Departmental OR Intra/ Inter School Open Electives			
Course Outcome:			
Students can choose one of these open electives. But they need to take prior permission from School Director before joining one of these elective courses. \they must produce successful completion certificate / credits earned to the School after completing the underwent course.			

Code:	MCA-401	COMPILER DESIGN	Credits: 04

Course Objectives:

To discuss the techniques of scanning, parsing & semantic elaboration well enough to build or modify front end.

To expose the critical issues in modern compilers & provide them with the background to tackle those problems.

Course Outcome:

CO1: Identify all essential steps for automatically converting source code into object code.(Understand)

CO2: Generate the low-level code for calling functions/methods in modern languages. (Apply)

CO3: Discuss opportunities for optimization introduced by naïve translation and approaches for achieving optimization such as instruction selection, instruction scheduling, register allocation, and peephole optimization.(Apply)

CO4: Interpret benefits and limitations of automatic memory management. (Understand)

CO5: Explain advantages, disadvantages and difficulties of just in time and dynamic recompilation. (Understand)

Unit-1:	Introduction to Compiling and Lexical Analysis

Definition, analysis of the source program, the phases of a compiler, the grouping of phases, Compiler- Construction tools, The role of the Lexical analyzer, Input buffering, Specification of Tokens, A Language for Specifying Lexical Analyzers, Design of a Lexical Analyzer generator.

Unit-2:	Syntax Analysis

The role of the Parser, Context-free grammars, Writing a Grammar, Top-Down Parsing, BottomUp Parsing, Operator-precedence Parsing, LR-Parsers, Using Ambiguous Grammars, Parser Generators.

Unit-3:	Syntax-Directed Translation

Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-attributed definitions, Top-Down Translation, Bottom-Up Evaluation of Inherited attributes.

Unit-4:	Intermediate Code Generation

Intermediate Languages, Declarations, Assignment Statements, Boolean Expressions, Case Statements, Back patching, Procedure Calls.

Unit-5:	Code Generation

Issues in the Design of a Code Generator, The target Machine, Run-Time Storage Management, Basic Blocks and Flow Graphs, Next-Use Information, Simple Code Generator, Register allocation and Assignment, The DAG Representation of Basic Blocks, Generating Code from DAGs, Dynamic Programming, Code-Generation Algorithm, Code-Generators.

Unit-6:	Code Optimization

Peephole Optimization, Principal sources of optimization, Introduction to Global data flow analysis.

Text Books:	
1.	Aho, Sethi, Ullman, Compilers-tools and Techniques, Addison Wesley, 1987
2.	Trembly, Sorenson,Theory and Practice of Compiler Writing, McGraw Hill, 1984.
3.	Hopcroft, Introduction to Automata Theory, Languages and Computation, Pearson Publication
Reference Books	
1.	Paul G. Sorenson, Compiler Writing, Tata McGraw Hill.
2.	Hunter, The Essence of Compilers, Pearson Publication
3.	Lewis, Elements of the Theory of Computation, Pearson Publication

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	-	M	-	-	S	-	L	-	-	S	-
CO2	S	-	S	-	S	-	L	M	-	-	-	-
CO3	L	-	-	-	L	-	-	-	-	-	S	M
CO4	S	-	-	-	-	-	-	-	-	L	L	L
CO5	S	-	-	-	-	-	-	-	S	-	M	M

S- Strong; M-Medium; L-Low

Code:	MCA 402	Java Programming	Credits: 04

Course Objectives:

The objective of this course is to create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism, use data types, arrays and other data collections, implement error-handling techniques using exception handling, create and event-driven GUI using Applet.

Course Outcome:

CO1: To design, write, compile, test and execute straightforward programs using a high level language.
CO2: To implement, compile, test and run Java programs comprising more than one class, to address a particular software problem
CO3: To demonstrate the ability to use simple data structures like arrays in a Java program.
CO4: To demonstrate the ability to employ various types of selection constructs in a Java program.
CO5: To employ a hierarchy of Java classes to provide a solution to a given set of requirements.

Unit-1: Introduction to java:

History, Features, Java program structure, Java tokens, Java Statements, Java virtual machine, Command line arguments, Constants, Variable, Data types, Decision making and branching, looping, Class, Methods, Objects, Method overloading, Nesting of methods

Unit-2: Inheritance and System packages

Overriding methods, Final variables, Final methods, Final Classes, Abstract methods, Abstract Classes, Visibility Control, Arrays, Strings, Vectors, Naming conventions, Creating and accessing packages, Introduction to multithreaded programming, Creating and extending threads, Life cycle of thread, Thread exception, Thread priority, Synchronization, Exception handling, Multiple catch statements, finally statement, Throwing our own exceptions, Exception for debugging

Unit-3: Applets and Graphics

Applet code, Applet life cycle, creating an executable applet, designing a web page, Applet tag, passing parameter to applet, Lines, Rectangles, Circles, Ellipses, Arcs, Polygons, Line graphs, Bar charts, Control loops in applet

Unit-4: Java Database Connectivity

The design of JDBC, JDBC driver types, Basic JDBC programming, concept.

Unit-5: Java Beans and Swing:

Introduction to Java Bean, Advantages of Java beans, Application Builder tools, Using BDK, JAR Files, JApplet, JIconsand Labels, Textfields, Buttons, Combo Boxes, Scroll panes, Trees, Tables, Menu, Bars and Menus, Tool Bars, Dialog Boxes, File dialog, Progress Bar.

Unit-6: Servlets

Servlets and Java Server Pages : The life cycle of a servlets, Using Tomcat for server development, A simple servlet, Using cookies, Session Tracking, Introduction to java server pages, A simple JSP, example, Scripting.

Text Books:		
1.	Programming with Java A Primer – E.Balaguruswamy, McGrawhill	
2.	Java 7 Programming Black Book - Kogent Learning Solutions Inc, Dream Tech press	
Reference Books		
1.	Java Fundamentals A comprehensive introduction- Herbert Schildt, Dale Skrien, McGraw Hill.	
2.	The Complete Reference, Java 2 – Herbert Schild, Fourth Edition, - TMH.	
3.	Core Java Volume-I Fundamentals- Horstmann and Cornell, - Pearson Education.	

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	S	S	S	-	S	S	S	-	S	-	L	-
CO2	S	S	S	-	S	S	S	-	S	-	-	-
CO3	M	S	S	-	M	S	S	-	S	-	L	-
CO4	L	M	S	-	L	M	S	-	L	-	L	-

S- Strong; M-Medium; L-Low

Code:	MCA-403	Operating System Concepts	Credits: 04

Course Objectives:

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5. To know the components and management aspects of concurrency management
6. To learn programmatically to implement simple OS mechanisms

Course Outcome:

Students will be able to:

CO1: Analyze the structure of OS and basic architectural components involved in OS design

CO2: Analyze and design the applications to run in parallel either using process or thread models of different OS

CO3: Analyze the various device and resource management techniques for timesharing and distributed systems

CO4: Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system

CO5: Interpret the mechanisms adopted for file sharing in distributed Applications

CO6: Conceptualize the components involved in designing a contemporary OS

Unit-1:	Introduction

Introduction: System structure, user perspective, operating system services, system commands, assumption about Hardware, Shell Programming: Bourne shell and C shell programming, variables, constants, environments, control structures, shell scripts examples

Unit-2:	Introduction to Kernel

Architecture of Unix Operating system, System concepts, kernel data structures, system administration.

Unit-3:	Internal Representation of files

Inodes, Structure of a regular file, Directories, super block, Inode assignment to new file, allocation of disk blocks

Unit-4:	System Calls for the file System

Open, Read, Write, file and recording locking, close, file creation, creation of special files, change directory and change root.

Unit-5:	Structure of process

Process states & Transition, layout of system memory, layout of the kernel, Context of process, saving the context of the process, SLEEP

Unit-6:	Process Control

Process creation, signals, process Termination, awaiting process termination, invoking other Programs, UID of a process, changing the size of a process, The shell, system boot and the init process.

Text Books:

1.	Andrew Tanenbaum, **"**Modern Operating Systems**"**, Fourth Edition, Pearson Education,Global edition

2.	Abraham Silberschatz, Greg Gagne, Peter B. Galvin, **"**Operating System Concepts**"**, 9th edition, Wiley,
Reference Books	
1.	The Design of the Unix operating System by Maurice J. Bach
2.	Unix System Administration A Beginner‟s Guide by Steve Maxwell publishing by McGraw-Hill/Osborne
3.	Learning the Unix Operating By Jerry Peek, Grace Todino & John Strang; ISBN 1-56592-390-1, 4 thEd. O‟REILLY
4.	William Stallings, Operating Systems, Prentice Hall.
5.	Harvey M. Deitel, An introduction to operating systems. Addison-Wesley.

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	L	S	L	S	L							
CO2	S	M	M	S	M	S						
CO3.	S	M	M	S	M	S						
CO4.	S	S	S	S	S	L		L				
CO5.	S	S	S	S	S	L		L				
CO6.	L	S	M	L	M	L		L				

S- Strong; M-Medium; L-Low

Code:	MCA-404 (a)	Software Metrics and Project Management	Credits: 04

Course Objectives:

At the end of this course the students will Understand

1. Understand the five process groups and nine knowledge areas of the PMI Book.
2. Understand approaches for managing and optimizing the software development process.
3. Understand efficient techniques for managing each phase of the systems development lifecycle, Use and application of tools to facilitate the software project management process.

Course Outcome:

CO1: Software Project Management covers details about handling the project activities.
CO2: To study about the principals and modern software project management practices.
CO3**:** TO understand the five process groups and nine knowledge areas of the Project Management Institute Body of Knowledge (PMI BOK) are examined in the context of the systems development lifecycle.
CO4: Portfolio management and the use and application of software project management tools are also discussed

Unit-1:	**Fundamentals of Project Management**

Definition, Characteristics of Project, Types of Project, Project Phases, Project management Process, Project life cycle, Project Life Cycle Models

Unit-2:	**Project formulation**

Significance of project formulation, Step-Wise Approach to Project formulation, Feasibility analysis, Cost Benefit Analysis, Cash flow forecasting, Return on Investment.

Unit-3:	**Software project Approach Selection**

Project Vs Activity, Activity Planning, Planning Approaches, Process models, Waterfall model, V Model, Spiral model, Software prototyping, appropriate model selection

Unit-4:	**Software Effort Estimation**

Software estimation techniques, Estimation Approaches, Definition of Project scheduling, Project controls and importance, Network techniques of Project Management: Gantt chart, CPM, PERT, COCOMO

Unit-5:	**Risk and Uncertainty Decisions**

Project Risk, Types of Project Risk, Identification of Risk, Risk Prioritization, Project risk Analysis, Qualitative analysis and Quantitative analysis, Sensitivity Analysis, Break Even analysis, Risk Planning

Unit-6:	**Resource Allocation**

Resources, Barman's Priority list, Cost Schedules, Software quality assurance, relation between software quality and software productivity, Role of project manager in software development

Text Books:

1.	Software Project Management, Bob Hughes and Mike Cottrell, Tata McGraw Hill.
2.	Project Management, S. Chaudhary, Tata McGraw Hill.

Reference Books	
1.	Project-Preparation, Appraisal, Budgeting and Implementation, Prassna Chandra, Tata McGraw Hill.
2.	Software Project Management: A real-world Guide to Success, Joel Henry, Pearson education.

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
CO1	M	-	-	-	S	-	-	S	-	--	-	-
CO2	M	L	-	L	S	-	-	S	M	-	L	-
CO3	S	L	-	L	M	-	-	S	M	-	-	L
CO4	S	L	M	L	L	-	M	-	M	-	-	-

Code:	MCA-404 (b)	Software Testing Tools	Credits: 04
Course Objectives:			
To understand the testing concepts with software quality measures and quality assurance. To understand the defect management and improve software quality. To understand the testing tools.			
Course Outcome:			
This course will give deep knowledge about software testing concepts with various kinds of software tools and techniques. This course also guides students to learn software quality measures and quality improvement strategies.			
CO1: The students will be able to understand the concepts of software testing and its techniques. CO2: Knowledge of verification and validation activities. CO3: Study of black box and white box testing techniques. CO4: Study the concept of regression testing and its techniques. CO5: Study of object oriented testing techniques. CO6: Study of case studies and various testing automation and debugging tools. CO7: Study of various testing metrics.			
Unit-1:	**Introduction**		
Introduction, Nature of errors, an example for Testing, Definition of Quality, QA, QC, QM and SQA, Software Development Life Cycle , Software Quality Factors Verification and Validation Definition of V andV, Different types of V and V Mechanisms, Concepts of Software Reviews, Inspection and Walkthrough.			
Unit-2:	**Software Testing Methods and strategies**		
Testing Fundamentals, Test Case Design, White Box Testing and its types, Black Box Testing and its types, Strategic Approach to Software Testing, Unit Testing, Integration Testing, Validation Testing, system Testing.			
Unit-3:	**Software Metrics and Defect Management**		
Concept and Developing Metrics, Different types of Metrics, complexity metrics, Definition of Defects, Defect Management Process, Defect Reporting, Metrics Related to Defects, Using Defects for Process Improvement.			
Unit-4:	**Quality Improvement**		
Introduction, Pareto Diagrams, Cause-effect Diagrams, Scatter Diagrams, Run charts.			
Unit-5:	**Software Quality Assurance and Quality Costs**		
Concepts, Quality Movement, Background issues and SQA activities Software Reviews, Formal Technical Reviews, Formal approaches to SQA Statistical Quality Assurance, Software Reliability, SQA Plan, The ISO 9001 Quality Standard, Six sigma, Informal Reviews, Quality Cost Measurement, Utilizing Quality Costs for Decision-Making .			
Unit-6:	**Testing Tools**		
Testing Tools, Introduction to Junit, Apache Jmeter, Winrunner, Loadrunner, Rational Robot			
Text Books:			
1.	Software Engineering A Practitioners Approach-, Roger S. Pressman, Tata McGraw Hill		

2.	Software Engineering for Students- A Programming Approach - Douglas Bell, Pearson
3.	Software engineering: An Engineering approach- J.F.Peters, W.Pedrycz, Wiley Press
Reference Books	
1.	Quality Management- Donna C. S. Summers, 5th ed., Prentice-Hall.
2.	Total Quality Management- Dale H. Besterfield, Prentice Hall.
3.	Software testing- Yogesh Singh, Cambridge publication

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	M	S	-	L	L	-	L	-	L	-	-	L
CO2	-	M	L	M	-	-	L	-	L	-	L	-
CO3	-	M	L	S	-	L	L	-	-	M	-	-
CO4	-	M	-	L	-	M	L	-	L	-	-	M
CO5	L	M	M	M	-	L	L	-	L	-	-	-
CO6	-	-	-	M	-	-	-	-	L	M	-	-
CO7	L	-	L	-	-	-	L	-	L	M	-	-

S- Strong; M-Medium; L-Low

Code:	MCA-404 (c)	Accounting and Management Control	Credits: 04
Course Objectives:			
This course aims the students to have better idea about the accounting principles and concepts as well as their application, basic accounting-related vocabulary and how to work with accounting data. It generally prepares students for related business courses and work as an accounting professional			
Course Outcome:			
CO1: Acquire knowledge about general aspects of business operations. CO2: Describe the role of accounting information system and its limitations. CO3: Analyze and evaluate costing systems, prepare master budgets, evaluate managerial performance provide decision support for cost management and other managerial decisions. CO4: Analyze transaction cycles and accounting processes, evaluate risk, and recommend internal controls for accounting processes. CO5: Use software to improve efficiency and internal control, analyze data and support decision making.			
Unit-1:	**Financial accounting**		
Meaning and scope of accounting –Principles –Concepts –Conventions -Accounting Standards -Final accounts -Trial balance -Trading account -Profit and loss account-Balance sheet -Accounting ratio analysis -Funds flow analysis -Cash flow analysis			
Unit-2:	**Accounting**		
Meaning –Objectives- Elements of cost -Cost sheet -Marginal costing and cost volume Profit analysis -Break even analysis –Applications –Limitations -Standard costing and variance analysis –Material –Labor –Overhead –Sales -Profit Variances.			
Unit-3:	**Budgets and budgeting control**		
Budgets and budgetary control –Meaning –Types -Sales budget -Production budget -Cost of production budget -Flexible budgeting -Cash budget -Master budget -Zero base budgeting -Computerized accounting.			
Unit-4:	**Investment decisions**		
Objectives and functions of financial management –Risk -Return relationship -Time value of money concepts			
Unit-5:	**Cost of capital**		
Capital budgeting -Methods of appraisal -Cost of capital -Factors affecting cost of capital -Computation for each source of finance and weighted average cost of capital.			
Unit-6:	**Financing decision and working capital management**		
Capital structure -Factors affecting capital structure –Dividend policy -Types of dividend Policy -Concepts of working capital -Working capital policies -Factors affecting working capital -Estimation of working capital requirements.			
Text Books:			
1.	Maheswari, S. N., Financial and Management Accounting, Sultan Chand and Sons, 2011		
Reference Books			

1.	Pandey, I. M., Financial Management, 10thEdition, Vikas Publications, 2010
2.	Iyengar, S.P., Cost and Management Accounting, Sultan Chand and Co.,5thEdition,2010

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	M	S	-	L	L	-	L	-	L	-	-	L
CO2	-	M	L	M	-	-	L	-	L	-	L	-
CO3	-	M	L	S	-	L	L	-	-	M	-	-
CO4	-	M	-	L	-	M	L	-	L	-	-	M
CO5	L	M	M	M	-	L	L	-	L	-	-	-

S- Strong; M-Medium; L-Low

Code:	MCA-404 (d)	Enterprise Resource Planning	Credits: 04

Course Objectives:

With the basic concepts of ERP systems for manufacturing or service companies, and the differences among(Material Requirement Planning)MRP, MRP II, and ERP systems; .Apply the principles of ERP systems, their major components, and the relationships among these components; with the knowledge of typical ERP systems, and the advantages and limitations of implementing ERP systems. To comprehend the technical aspects of ERP systems. To be able to map business processes using ERP concepts and technique.

Course Outcome:

CO1: To understand the significance of ERP and their impact on organizational growth.
CO2: To learn ERP and related technology in terms of integrated data modeling.
CO3: To analyze ERP from the manufacturing perspective.
CO4: To understand the different type of ERP modules and their information flow.
CO5: To enable students to understand the ERP implementation lifecycle.
CO6: Highlight the benefits of different ERP modules and Differentiate ERP modules with their information flow

Unit-1: Introduction to ERP:

Introduction, Evolution of ERP, What is ERP? Reasons for the growth of the ERP market, The advantages of ERP, Why do Man ERP Implementations Fail? Why are ERP packages Being used Now? Integrated Management Information, Business modeling, Integrated Data Model.

Unit-2: ERP and Related Technologies:

Introduction, Business Process Reengineering, Management Information System, Decision Support System, Executive Information Systems, Data Ware housing, Data Mining, On-line Analytical Processing, Supply Chain Management.

Unit-3: ERP - Manufacturing Perspective:

Introduction, ERP. CAD/CAM, Materials Requirements Planning, Bill of Material, Closed Loop MRP. Manufacturing Resource Planning, Distribution Requirements Planning, JIT and Kanban, Product Data Management, Benefits of PDM, Make-to-order, and Make-to Stock, Assemble to order, Engineer to order, Configure-to order.

Unit-4: ERP Modules & Benefits:

Introduction, Finance, Plant Maintenance, Quality Management, Materials Management. Introduction, Reduction of Lead time, On-time shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Suppler Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Decision–making capability.

Unit-5: ERP Implementation Life Cycle:

Pre-evaluations Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation of Team Training, Testing, Going Live, End user Training, Post implementation Vendor, Consultants and Users: Introduction, In-house implementation–Pros and Cons, Vendors, Consultants, End-users.

Unit-6: Case Studies:

SAP R/3, People Soft, Oracle Financials, Architecture, data dictionary, development tools,

administration tools, reporting and analysis tools, integration tools.	
Text Books:	
1.	EnterpriseResourcePlanning,Alexis Leon,TataMc Graw HillPublishingCompany Ltd-2002.
2.	EnterpriseResourcePlanningConceptandPractice,VinodKumarGargandVenkitakrishnan, PrenticeHall,India-2ndEdition,2004
3.	J.A.Hernandez, "The SAP R/3 Handbook", 1998.
Reference Books	
1.	ManufacturingPlanning& Controls,ThomasVolloman,et,al.
2.	Michael Hsmmer, "Enterprise Resource Planning", 1998.
3.	K.Nagappan, "Digital Computers and Data Processing ", 1996.

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	-	-	M	-	L	-	L	M	M	L
CO2	S	S	-	-	M	-	L	-	L	-	L	-
CO3	S	S	-	-	M	-	L	-	-	M	M	-
CO4	S	S	-	-	M	-	L	-	L	-	M	M
CO5	S	S	-	-	M	-	L	-	L	M	M	-
CO6	S	S	-	-	M	-	-	-	-	M	-	-

S- Strong; M-Medium; L-Low

Code:	MCA-405 (a)	Optimization Techniques	Credits: 04
Course Objectives:			
The primary emphasis of the course is to introduce the important optimization techniques of Operations Research applied in the Industry, Economy, Business, Resource Allocation, Finance, Marketing, Simulation and Network Analysis. Optimization techniques use mathematical, computational, and scientific methods for making decisions to solve real life optimization problems.			
Course Outcome:			
CO1: Understand the optimization techniques and Proficiency with tools from optimization, probability, statistics, simulation, and engineering CO2: Create economic analysis, including fundamental applications of those tools in industry contexts Involving uncertainty and scarce or expensive resources. CO3: Apply the facility with mathematical and computational modeling of real decision-making problem CO4: Analyze the modeling tools and computational tools, as well as analytic Skills to evaluate the problems. CO5: Evaluate the facility with the design, implementation, and analysis of computational experiments. CO6: Identify problems which can be formulated as a linear programming problem			
Unit-1:	**Basics of Operations Research**		
Introduction of Operation Research, definitions, features, advantages and applications, Linear Programming Problem (L.P.P.), Mathematical definition of a L.P.P. with its components: objective function and constraints, optimal solution, slack, surplus and artificial variables, Graphical method, Simplex method (Maximization case)			
Unit-2:	**Dynamic Programming:**		
Transportation problem, Assignment problem. Basic Concepts, Bellman's optimality principles, Dynamics programming approach indecision making problems, optimal subdivision problem.			
Unit-3:	**Linear Programming Problem and Sequencing Problem**		
Simplex method (Minimization case), Two Phase Method, Big –M method ,Introduction of Job Sequencing, Notation, Terminology and Assumptions, Johnson's algorithm for processing n jobs through 2 machines, Johnson's algorithm for processing n jobs through 3machines, Johnson's algorithm for processing n jobs through m machines, Processing 2jobs through m machines using graphical method. (Exclude: Dual Problem and Revised Simplex Methods)			
Unit-4:	**Transportation Problem**		
Introduction of Transportation problem (T.P.), Mathematical Models of T.P., Method to find initial basic feasible solution, North-West Corner Method (NWCM), Least Cost Cell Entry Method (LCM), Vogel's Approximation Method (VAM), Test of optimality for finding an optimum solution –MODI method, Variations in Transportation Problem (Unbalanced supply and demand) (Exclude: Degeneracy resolution, Alternative Optimal Solution Prohibited transportation routes)			
Unit-5:	**Assignment Problem (A.P.)**		
Introduction of Assignment Problem (A.P.), Mathematical Models of an Assignment Problem, Method to find an optimum solution -Hungarian Method, Variations of the Assignment Problem: Multiple optimal solutions, Maximization case, Unbalanced Assignment Problem, Restrictions on			

Assignments		
Unit-6:	**Project Management (PERT and CPM)**	
Introduction of Project Management, basic difference between PERT and CPM, Network Concepts, Components, Rules for Network Construction, Critical Path Analysis (Forward Pass, Backward Pass, Critical Path)		
Text Books:		
1.	Computer based optimization techniques, Shubham Agarwal, Alpha science international limited, 2015.	
2.	J. K. Sharma, "Operations Research–Theory and Application", 4th Edition, Macmillan Publishers India Ltd.	
3.	Introduction to Operation Research, Computer Oriented Algorithmic approach Gillet B.E.Tata McgrawHill publishingLtd,NewDelhi,1982.	
Reference Books		
1.	Operations Research, P.K. Gupta & D.S. Hira, S.Chand &Co.	
2.	Operations Research: Theory and Applications, J.K. Sharma, MacMillan.	
3.	Operations Research, S.D. Sharma, Kedar Nath Ram Nath, Meerut(UP).	

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	S	S	-	M	M	-	-	-	-	M	M	L
CO2	S	S	-	M	M	-	-	-	-	-	L	-
CO3	S	S	-	M	M	-	-	-	-	M	M	-
CO4	S	S	-	M	M	-	-	-	-	-	M	M
CO5	S	S	-	M	M	-	-	-	-	M	M	-
CO6	S	S	-	M	M	-	-	-	-	M	-	-

S- Strong; M-Medium; L-Low

Code:	MCA-405 (b)	Statistical Computing	Credits: 04

Course Objectives:

To provide students with a framework that will help them choose the appropriate descriptive methods in various data analysis situations. And To apply estimation and testing methods to make inference and hypothesis for decision making.

Course Outcome:

CO1: How to calculate and apply measures of central tendency and measures of dispersion –in real time data

CO2: Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis for comparison and forecasting purpose

CO3: Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.

CO4: Understand the concept of p-values.

CO5: Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit also perform ANOVA and F-test

Unit-1:	Introduction to Statistics:

Introduction to Statistics and data analysis-Measures of central tendency, Measures of dispersion, Skewness and Kurtosis.

Unit-2:	Correlation and regression:

Correlation and Regression–Rank Correlation-Partial and Multiple Correlation Regression, Multiple Regressions.

Unit-3:	Testing of hypothesis I:

Introduction-Types of errors, Critical region, procedure of testing hypothesis-Large sample tests Z-test for Single Proportion, Difference of Proportion, Single mean and difference of means.

Unit-4:	Testing of hypothesis II:

Small Sample Tests -Student t-test, F-test, Chi-Square test for independence of Attributes, Analysis of Variance-One-way, Two-way Classification, Principles of experimental design, Completely randomized design, Randomized block design, Latin Square design-Problems.

Unit-5:	Statistics using SPSS

Introduction to SPSS, SPSS: general description, functions, menus, commands, SPSS file management, Input and data cleaning, Data manipulation, Descriptive analysis of data, Statistical tests, Correlation and regression, Multivariate analysis.

Unit-6:	Industry Expert Lecture

Organize Industry Expert Lecture on the recent trends and statistical computing methods used for research.

Text Books:

1.	Applied Statistics and Probability for Engineers, 6ed, (2016),Douglas C. Montgomery George C. Runger, John Wiley & Sons
2.	Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences(2017) by J. Susan Milton and Jesse Arnold, Mc.Grawhill education

Reference Books	
1.	Statistics for Engineers and Scientists (2017) by Navidi ,McGraw-Hill Education –Europe
2.	Fundamentals of Statistics (2016) by S.C. Gupta seventh revised and enlarged edition

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	-	M	M	-	-	-	-	M	M	L
CO2	S	S	-	M	M	-	-	-	-	-	L	-
CO3	S	S	-	M	M	-	-	-	-	M	M	-
CO4	S	S	-	M	M	-	-	-	-	-	M	M
CO5	S	S	-	M	M	-	-	-	-	M	M	-

S- Strong; M-Medium; L-Low

Code:	MCA-405 (c)	Cyber Law and Security	Credits: 04
Course Objectives:			
To understand the basics of cyber law, its related issues and ethical laws of computer for different countries.			
Course Outcome:			
CO1 Understanding about Cybercrime and cyber offenses CO2 Understanding about security challenges of mobile devices CO3 Analyzing on Tools and Methods Used in Cybercrime CO4 Understanding about Cyber Law and Cyber security CO5 Understanding about strengths and weaknesses of Indian ITAct CO6 Understanding about Cyber Forensics			
Unit-1:	**Introduction to Cybercrime:**		
Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security Who are Cybercriminals?, Classifications of Cybercrimes,· Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, · Cybercrime and the Indian ITA 2000,·AGlobalPerspective on Cybercrimes			
Unit-2:	**Cyber Offenses:**		
Introduction, How Criminals Plan the Attacks, Social Engineering Cyber stalking, Cyber café and Cybercrime, Botnets, The Fuel for Cyber crime, Attack Vector, Cloud Computing			
Unit-3:	**Cybercrime: Mobile and Wireless Devices**		
Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Device Registry,SettingsforMobileDevices,AuthenticationServiceSecurity,Attacks on Mobile/ Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops			
Unit-4:	**Tools and Methods Used in Cybercrime:**		
Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks Phishing and Identity Theft Introduction, Phishing, Identity Theft(ID Theft)			
Unit-5:	**Cybercrimes and Cyber security:**		
The Legal Perspectives Introduction, Cybercrime and the Legal Landscape around the World, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyber law, Technology and Students: Indian Scenario			
Unit-6:	**Computer Forensics:**		
Understanding Computer Forensics · Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail· Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting up a Computer Forensics			

Laboratory: Understanding the Requirements, Computer ForensicsandSteganography,RelevanceoftheOSI7Layer Model to Computer Forensics. Forensics and Social Networking Sites: The Security/ Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics · Special Tools and Techniques, Forensics Auditing Anti forensics	
Text Books:	
1.	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives–Nina Godbole, Sunit Belapure, Wiley :April2011IndiaPublications Released
2.	Windows Forensics: The field guide for conducting corporate computer investigations-Chad Steel, Wiley ,December2006IndiaPublications
Reference Books	
1.	Internet Forensics:UsingDigitalEvidencetoSolveComputerCrime-RobertJones,O'Reilly Media,Released:October2005

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	M	L	L	S	S	M	M	L	L
CO2	S	S	S	S	M	M	L	L	M	S	S	-
CO3	S	S	S	S	S	S	M	M	L	L	S	-
CO4	S	S	M	M	L	L	S	S	M	L	M	M
CO5	S	S	S	M	M	L	S	L	S	M	M	-
CO6	S	M	M	S	S	L	S	S	M	S	M	-

S- Strong; M-Medium; L-Low

Code:	MCA -405 d)	Information Security	Credits: 04

Course Objectives:

1. To understand the basic categories of threats to computer and network.
2. To understand intrusion and intrusion detection.
3. To defend the need for protection, security, and the role of ethical consideration in computer use.
4. To describe efficient basic number algorithms.
5. To discuss the fundamental ideas and algorithms of secret key, cryptography and public key cryptography.

Course Outcome:

CO1: To explore a comprehensive study of the principles and practices of computer system security
CO2: To continually strengthen and improve the overall capabilities of the information security management system
CO3: To increase professional skills in terms of information security management and technology
CO4: To establish quantified information security goals annually through management and review meetings

Unit-1: Introduction to Cryptography

Active vs. passive attacks, Layers and cryptography, Authorization, Viruses, Worms, Trojan horses, The multi level model of security, Legal issues, What is cryptography? Breaking an encryption scheme, Types of cryptographic functions, Secret key cryptography, Public key cryptography, Hash algorithms.

Unit-2: Secret Key Cryptography

Generic block encryption, Data encryption standards, International data encryption algorithm, Advanced encryption standard.

Unit-3: Modes of Operation, Hashes and Message Digests

Encrypting a large message, Generating MACs, Multiple encryptions DES, MD2, MD4, MD5,
SHA-1, HMAC.

Unit-4: Public Key Algorithms

Modular arithmetic, RSA, Diffie-Hellman, Digital signature standard, Elliptic curve cryptography.

Unit-5: Number Theory and Authentication

Password based and Cryptographic based authentication protocol

Unit-6: Cryptographic Standards

Kerberos, PKI, IPSec.

Text Books:

1.	Kaufman Charlie, Perlman Radia, Speciner Mike, Network Security: Private Communication in public World, PHI publication, 2001.
2.	William Stalling, Network Security Essentials: Applications and Standards, 2nd edition, Prentice Hall publication,2002.

3.	William Stalling, Cryptography and Network Security, Prentice Hall publication, 2003
Reference Books	
1.	Vyless, Internet Security Protocol, Pearson publication.
2.	Comer D.E., Internetworking with TCP/IP, 5th edition, Pearson publication, 2006
3.	Morrison, Information Security-An Overview, PHI publication, 1995

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	M	M	-	L	L	-	L	-	L	-	-	L
CO2	-	M	M	M	M	-	L	-	L	-	L	-
CO3	L	M	M	S	-	L	L	-	-	M	-	M
CO4	-	M	-	L	-	L	L	-	L	-	-	L

S- Strong; M-Medium; L-Low

Code:	MCA -406	Lab -7 Java Programming	Credits: 02

Course Objectives

To enable the students practice the concepts of java programming language and develop solutions for real world problems.

Course Outcomes

CO1: Understand the enabling technologies for building internet applications. Understand
CO2: Write Java programs for techniques and features of the networking and remote method development to Construct a internet application. Apply
CO3: Implement packages, access specifiers and interfaces in a program Apply
CO4: Implement Program for Events and interactivity using Layout Manager. Apply
CO5: Generate program for network chatting Analyze
CO6: Write technical report on the observations from the experiments

Develop programs for

1. Use of Objects
2. Using classes and inheritance
3. JNI concepts
4. Multithread applications
5. Exception handling
6. Implementing packages, access specifiers and interfaces
7. Streams
8. JDBC program using different statements
9. Applet program for Animation text, images and sounds
10. Events and interactivity using Layout Manager.
11. Socket program for network chatting
12. Client server application using RMI techniques

Note:

The Exercises are collection of program specifications shall be designed by the course instructor and assigned to the students.

Reference Books

1.	Herbert Schildt, "Java the Complete Reference", 9th Edition, McGraw Hill, 2014
2.	Margaret Levine Young, "The Internet - Complete Reference" , 2nd Edition, Tata McGraw Hill, 2002, (Reprint 2016).
3.	Paul Deitel,Harvey Deitel,Abbey Deitel, "Internet and WWW How to Program", 5th Edition, Tata McGraw Hill, 2011.

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	S	S	M	-	-	-	-	-
CO2	S	M	S	S	M	M	M	-	-	-	-	-
CO3	S	S	M	S	S	S	M	-	-	-	-	-
CO4	S	S	M	S	S	M	M	-	-	-	-	-

CO5	S	S	S	S	S	M	M	-	-	-	-	-
CO6	S	S	S	S	S	M	M	-	-	-	-	-

S- Strong; M-Medium; L-Low

Code:	MCA -407	Lab -8 Linux Operating System	Credits: 02

Course Objectives

To enable the students practice the concepts of Operating systems and develop solutions for real world problems.

Course Outcomes

CO1: Have a good orientation towards concept-based approach and practical-based approach
CO2: Students will be able to describe the components of a modern operating system
CO3: Apply operating system concepts practically
CO4: Apply the concepts of operating systems design to practical problems

Develop programs for

1. Configuring Operating System, Basic Linux Commands
2. Header files: Process creation and Process joining
3. Create processes using for k() and check different states i.e. zombie, orphan
5. Sum of numbers from1to10, by dividing the job into two processes (parent and one child)
6. Copy the contents of one array to another.
7. Create two child processes and display the output.
8. Program to add four integer values using 2 process
9. Program to find out the factoids of a number
10. Program to fork a child and print the process id of parent and child process
11. Program to create a thread and join the thread
12. Program to find maximum number from the integer numbers using thread
13. Implement ROUND ROBIN algorithm for CPU scheduling.
14. Implement Shortest Job First algorithm for CPU scheduling
15. Implement IPC using pipe to read and write a string from the user.

Note:

The Exercises are collection of program specifications shall be designed by the course instructor and assigned to the students.

Reference Books

1.	"Modern Operating Systems", by Andrew S. Tannenbaum, PHI, 3rd Edition
2.	"Operating System Concepts",William Stallings, Pearson, 5th Ed
3.	"Operating Systems", Madnick E.,Donovan J., TataMcGrawHill,2001

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	S	S	M	-	-	-	-	-
CO2	S	M	S	S	M	M	M	-	-	-	-	-
CO3	S	S	M	S	S	S	M	-	-	-	-	-
CO4	S	S	M	S	S	M	M	-	-	-	-	-

S- Strong; M-Medium; L-Low

Code:	MCA 408	Open Elective	Credits: 02
Course Objectives:			
University Recognized MOOC (NPTEL/ SWAYAM/ Others) OR Intra/Inter Departmental OR Intra/ Inter School Open Electives OR In house Open Elective – Seminar Presentation Activity			
Course Outcome:			
Students can choose one of these open electives. But they need to take prior permission from School Director before joining one of these elective courses. \they must produce successful completion certificate / credits earned to the School after completing the underwent course.			

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