MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Master of Computer Applications (MCA) (2 Year Programme) (Semester I) ***Recommended W.E.F JULY 2020***

Scheme of Examination

S. No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam		L	T	P	
1.	BSC	680111	Mathematical Foundations	70	20	10	-	-	-	-	100	3	-	-	3
2.	DC	680112	Data Structures and Algorithms	70	20	10	-	-	-	-	100	3	1	-	4
3.	DC	680113	Database Management Systems	70	20	10	-	-	-	-	100	3	1	-	4
4.	DC	680114	Operating Systems	70	20	10	-	-	-	-	100	3	1	-	4
5.	BM	680115	Management Functions and Oral & Written Communication	70	20	10	-	-	-	-	100	3	-	-	3
6.	DLC	680116	Lab-I (Object Oriented Programming Lab)	-	-	-	90	60	-	-	150	-	-	6	6
7.	DLC	680117	Lab-II (DBMS Lab)	-	-	-	60	40	-	-	100	-	-	2	2
			Total	350	100	50	150	100	-	-	750	15	3	8	26

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Master of Computer Applications (MCA) (2 Year Programme) (Semester-II) ***Recommended W.E.F JULY 2020***

Scheme of Examination

S. No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam		L	T	P	
1.	DC	680211	Software Engineering	70	20	10	-	-	-	-	100	3	1	-	4
2.	DC	680212	Internet of Things (IoT)	70	20	10	-	-	-	-	100	3	1	-	4
3.	DC	680213	Computer Networks	70	20	10	-	-	-	-	100	3	1	-	4
4.	DE	DE	Departmental Elective-I	70	20	10	-	-	-	-	100	3	-	-	3
5.	BM	DE (BM)	Departmental Elective-II (BM)	70	20	10	-	-	-	-	100	3	-	-	3
6.	DLC	680223	Lab-III (Java Programming Lab)	-	-	-	90	60	-	-	150	-	-	6	6
7.	DLC	680224	Lab-IV (Business Programming Laboratory	-	-	-	60	40	-	-	100			2	2
			Total	**350**	**100**	**50**	**150**	**100**	-	-	**750**	**15**	**3**	**8**	**26**

Elective-I course *will run through Department List of Electives, as decided by respective BoS Department. Moreover, this may also be run through SWAYAM NPTEL MOOC based Learning Platform (with credit transfer facility) (if required) to address the technological advancements and diverse application orientation. The need is to be assessed by the department BoS.*

Elective-II course *will run through Department List of Electives (for Business Management), as decided by BoS Department.*

List of Electives will remain dynamic and may be kept updated, considering the industrial demand current practices.

DE-1 (Tentative)	
Subject Code	**Subject Name**
680214	Computer Architecture and Organization
680215	Computer Graphics and Multimedia
680216	Web Technology
680217	Machine Learning with Python

DE-2 (BM)	
Subject Code	**Subject Name**
680218	Managerial Economics
680219	Corporate Planning
680220	MIS Framework and Implementation
680221	Management of Software Projects
680222	Organizational Behavior

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Master of Computer Applications (MCA) (2 Year Programme) (Semester-III) **Recommended W.E.F JULY 2020**

Scheme of Examination

S. No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End sem. Exam.	Mid sem.	Quiz/ Assign.	End Sem. /Practical Viva	Sessional Work / Practical Record/ Assignment etc.	Assign ment	Exam		L	T	P	
1.	DC	680311	Artificial Intelligence and Applications	70	20	10	-	-	-	-	100	3	1	-	4
2.	BM	680312	Management Support Systems	70	20	10	-	-	-	-	100	3	-	-	3
3.	DC	680313	Data Mining and Warehousing	70	20	10	-	-	-	-	100	3	-	-	3
4.	DE	DE	Departmental Elective-III (MOOC)	-	-	-	-	-	25	75	100	3	-	-	3
5.	OC	OC	Open Category Course	70	20	10	-	-	-	-	100	3	-	-	3
6.	DLC	680322	Minor Project	-	-	-	90	60	-	-	150	-	-	06	06
7.	DLC	680323	Lab-V (Python Programming Lab)	-	-	-	60	40	-	-	100	-	-	04	04
			Total	280	80	40	150	100	25	75	750	15	1	10	26

Elective-III (MOOC) *will run through SWAYAM NPTEL MOOC based learning platform (with credit transfer facility.* **MOOC course will be treated as the course of open nature and will be decided by concerning department / BoS.**

Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. [This course may be run through SWAYAM/NPTEL based platform *(with credit transfer facility)* **and accordingly, OC pool may be created from the list of SWAYAM/NPTEL courses].**

List of Electives will remain dynamic and may be kept updated, considering the industrial demand / current practices.

DE-3 (Tentative)	
Subject Code	**Subject Name**
680314	Cloud Computing
680315	Data Analytics using R
680316	Big Data Computing
680317	Deep Learning for Computer Vision
680318	Human Computer Interaction

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Master of Computer Applications (MCA) (2 Year Programme) (Semester-IV) **Recommended W.E.F JULY 2020**

Scheme of Examination

S.No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot			L	T	P	
				End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation					
1.	SEMINAR/SELF STUDY	680405	Self Learning Presentation Seminar*	-	-	-	-	100	100	-	-	2	2
2.	DLC	680406	System Development Project Internship	-	-	-	300	200	500	-	-	20	20
			Total	-	-	-	**300**	**300**	**600**	-	-	**22**	**22**

*Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation)

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Master of Computer Applications (MCA) (2 Year Programme) (Semester-III) ***Recommended W.E.F JULY***

Scheme of Examination

S. No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End sem. Exam.	Mid sem.	Quiz/ Assign.	End Sem. /Practical Viva	Sessional Work / Practical Record/ Assignment etc.	Assign ment	Exam		L	T	P	
1.	DC	680311	Artificial Intelligence and Applications	70	20	10	-	-	-	-	100	3	1	-	4
2.	DC	680312	Management Support Systems	70	20	10	-	-	-	-	100	3	-	-	3
3.	DC	680313	Data Mining and Warehousing	70	20	10	-	-	-	-	100	3	-	-	3
4.	DE	DE	Departmental Elective-III# (MOOC)	-	-	-	-	-	25	75	100	3	-	-	3
5.	OC	OC	Open Category Course##	70	20	10	-	-	-	-	100	3	-	-	3
6.	DLC	680322	Minor Project	-	-	-	90	60	-	-	150	-	-	06	06
7.	DLC	680323	Lab-V (Python Programming Lab)	-	-	-	60	40	-	-	100	-	-	04	04
			Total	**280**	**80**	**40**	**150**	**100**	**25**	**75**	**750**	**15**	**1**	**10**	**26**

 # Elective-III (MOOC) ***will run through SWAYAM / NPTEL /MOOC based learning platform (with credit transfer facility,*** **MOOC course will be treated as the course of open nature and will be decided by concerning department / BoS.**

##Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. [This course may be run through SWAYAM/NPTEL based platform ***(with credit transfer facility)*** **and accordingly, OC pool may be created from the list of SWAYAM/NPTEL courses].**

List of Electives will remain dynamic and may be kept updated, considering the industrial demand / current practices.

DE-3 (Tentative)	
Subject Code	**Subject Name**
680314	Cloud Computing
680315	Social Networks
680316	Big Data Computing

OC	
Subject Code	**Subject Name**
680317	Web Technologies
680318	Human Computer Interaction
680319	Network and Cyber Security

MCA- ANNEXURE-II

(Syllabi of Open Category Courses)

Web Technologies

680317

Objectives:

- Understand best technologies for solving web client/server problems
- Analyse and design real time web applications
- Use Java script for dynamic effects and to validate form input entry
- Analyse to Use appropriate client-side or Server-side applications

UNIT I

History of the internet: Internetworking concepts, architecture, and protocol: Switch router etc., internet address and domains. Introduction World Wide Web (WWW), Hyper Text Transfer Protocol (HTTP), feature of HTTP protocol HTTP request- response model, Hyper Text Transfer Protocol Secure (HTTPS). Security on the web, proxy server, Firewall.

UNIT II

Introduction to Hyper Text Markup Language (HTML): HTML elements, XHTML syntax and Semantics, extensible Markup Language (XML), element, attributes, entity declarations. DTD files and basics of Cascading Style Sheet (CSS), Document object Model (DOM) history and levels, Document tree.

UNIT III

Introduction to Java Script: Basic concepts, variables and data types, functions, conditional statements, Loops, Operators, Arrays. Introduction to Web Services: UDDI, SOAP, WSDL.

UNIT IV

PHP : Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions.

UNIT V

PHP and MySQL : Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs

Course Outcomes:

Student would be able to

CO1: **Evaluate** web application architecture, technologies, services and frameworks.
CO2: **Integrate** javascript, Php and server side scripting languages to develop web applications.
CO3: **Debug**, test and deploy web applications in different web servers.
CO4: **Apply** the knowledge of web technology in developing web applications.
CO5: **Implement** small to large scale projects to provide live solutions in web application development fields.
CO6: **Evaluate** different solutions in the field of web application development.

TEXT BOOKS:

1. Web Technologies, Uttam Roy, OXFORD University press
2. Web programming with HTML, XHTML and CSS, 2e, Jon Duckett, Wiley India
3. Web programming Bai, Michael Ekedahl, CENAGE Learning, India edition
4. An Introduction to Web Design + Programming, Paul S.Wang, India Edition

Human Computer Interaction

680318

Objectives:

- To learn the foundations of Human Computer Interaction
- To become familiar with the design technologies for individuals and persons with disabilities
- To be aware of mobile HCI.
- To learn the guidelines for user interface

UNIT I

Foundations of HCI: The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks, Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. Case studies.

UNIT II

Design and software process: Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT III

Models and theories: Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT IV

Mobile HCI: Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

UNIT V

Web interface design: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

Course Outcomes:

Student would be able to

CO1: **Understand** the role of man and machine interaction for effective computing

CO2: **Design** effective HCI for individuals and persons with disabilities.

CO3: **Assess** the importance of user feedback.

CO4: **Explain** the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.

CO5: **Explore** the applications of mobile HCI Computing

CO6: **Develop** meaningful user interface.

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, —Human Computer Interaction, 3rd Edition, Pearson Education, 2004
2. Brian Fling, —Mobile Design and Development, First Edition, O'Reilly Media Inc., 2009
3. Bill Scott and Theresa Neil, —Designing Web Interfaces, First Edition, O'Reilly, 2009.

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Network and Cyber Security

680319

Objectives:

- To understand and appreciate computer/information security
- To explain the core information assurance (IA) principles
- To provide students with concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques
- To identify the key components of cyber security network architecture
- To apply cyber security architecture principles
- To describe risk management processes and practices
- Identify security tools and hardening techniques
- To distinguish system and application security threats and vulnerabilities
- To describe different classes of attacks
- To define types of incidents including categories, responses and timelines for response
- To describe new and emerging IT and IS technologies
- To analyze threats and risks within context of the cyber security architecture
- To appraise cyber security incidents to apply appropriate response
- To access additional external resources to supplement knowledge of cyber security

UNIT I

Computer Security : Introduction, Need for security, Basics of Cryptography Plain text and Cipher Text, Substitution techniques, Caesar Cipher, Mono-alphabetic Cipher, Polygram, Polyalphabetic Substitution, Playfair, Hill Cipher, Transposition Cipher, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks

UNIT II

Symmetric Key Algorithms and AES Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm Overview of Symmetric key Cryptography, Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA), RC4, RC5, Advanced Encryption Standard (AES) Asymmetric Key Algorithms, Digital Signatures

UNIT III

Network Security, Firewalls and Virtual Private Networks Brief Introduction to TCP/IP, Firewalls, Virtual Private Networks (VPN), Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), Secure Sockets Layer (SSL), E-mail Security

UNIT IV

Introduction to information systems Types of information Systems, Development of Information Systems, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis

UNIT V

Security Policies Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR

Course Outcomes:

Student would be able to

CO1: **Discuss** various network security techniques, applications and policies

CO2: **Demonstrate** various computer security mechanisms and Symmetric Key Algorithms.

CO3: **Evaluate** security mechanisms using rigorous approaches by key ciphers

CO4: **Analyse** the vulnerabilities in any computing system to secure an IT infrastructure

CO5: Employ appropriate security techniques and policies to protect computers and digital information.

CO6: **Develop** policies and procedures to manage enterprise security risks.

TEXT BOOKS:

1. Bernard Menezes, "Network Security and Cryptography", CEGAGE Learning, ISBN-10:81-315-1349-1, ISBN-13: 978-81-315-1349-1, 2014.
2. Charles Pfleeger," Security in Computing", Prentice Hall, 4th Edition, ISBN-10: 0132390779, ISBN-13: 978-01323907744, 2006.
3. Ulysess Black, "Internet Security Protocols: Protecting IP Traffic", Prentice Hall PTR; 1st edition, ISBN-10: 0130142492, ISBN-13: 978-0130142498, 2000.
4. William Stallings, "Cryptography and Network Security", Pearson Education, 6th Edition, ISBN 10: 0133354695, 2013.
5. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997.
6. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006.

ANNEXURE-III

(DC and BM) Syllabus

Artificial Intelligence and Applications

680311

Objectives:

1. To study the concepts of Artificial Intelligence
2. To learn Methods of solving problems using Artificial Intelligence
3. To present an overview of artificial intelligence (AI) principles and approaches.
4. To introduce the concepts of Expert Systems and machine learning.
5. To have an appreciation for and understanding of both the achievements of AI and the theory underlying those achievements.
6. To have an appreciation for the engineering issues underlying the design of AI systems.
7. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
8. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

UNIT-I

An Overview of AI: Definitions, Foundations of AI: Philosophy, Mathematics, Psychology, Computer Engineering, linguistics, History of AI, Applications of AI, AI Productions system and problem formulation.

UNIT-II

AI Search and Control Strategies: Exploring alternatives: Finding a path: Depth first search, hill climbing, breadth first search, beam search, best first search; Finding the best Path: The British Museum search, Branch and Bound Search, A* Search, AO* Search; Game Playing: Minmax search, Alpha-beta pruning, Progressive deepening, Heuristic Pruning.

UNIT-III

Knowledge Representations: Concept of data, information and knowledge, semantic nets, partitioned semantic nets, Prepositional calculus, First order predicate calculus, Well Formed Formula (WFF), Clause form representation of WFFs, resolution principle & unification, inference mechanism, frame systems and value inheritance, scripts, conceptual dependency.

UNIT-IV

Problem solving by Planning and uncertainty handling and NLP: Components of planning system, Gold Stack Planning, Nonlinear Planning using constraint posting, probability theory, statistical reasoning, fuzzy sets and fuzzy logic, Overview of linguistics, grammars and languages, Parsing techniques

UNIT-V

Expert systems and Soft Computing: Introduction and applications of expert systems, Rule-based System Architecture, Non-production system architecture, Expert system

shells, Introduction to Some of the AI Techniques like neural networks, genetic algorithms, machine learning, pattern recognition, Robotics etc.

Books:

1. Introduction to AI and Expert Systems: D.W. Patterson PHI
2. Artificial Intelligence: P.H. Winston, Addison Wesley.
3. Principles of AI: N.J. Nilsson, Springer-Verlag
4. Artificial Intelligence: Saroj Kaushik, Cengage Learning
5. Artificial Intelligence: A Modern Approach: Stuart Russell and Peter Norvig, Pearson Education

Course Outcomes:

Student would be able to

CO1: **Demonstrate** knowledge of the building blocks of AI as presented in terms of productions system

CO2: **Analyse** and formalize the problem as a state space, graph, design heuristics and select amongst different search or game-based techniques to solve them.

CO3: **Develop** intelligent algorithms for search, control strategies and game playing.

CO4: **Attain** the capability to represent various real life problem domains using logic-based techniques and use this to perform inference or planning.

CO5: **Apply** concept planning and Natural Language processing to problems leading to understanding of cognitive computing.

CO6: **Explore** the latest trends in soft computing, expert systems and machine learning.

Management Support Systems

680312

Course Objective:

- To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
- To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
- To understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
- To use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
- To provide the theoretical models used in database management systems to answer business questions.

Unit-I

Organizations, Management and the Networked Enterprise – Information Systems in Global Business Today, Emerging digital firm, Strategy, perspectives and dimensions of Information systems, Network based strategies

Global E-business and Collaboration – Business processes, Systems for different management groups and Enterprise, E-Business, E-commerce, E-Government, Tools and technologies for Collaboration and Social Business, Porter's competitive forces model, The Business value chain Model

Unit-II

Ethical and Social issues in information systems – A model for Thinking about Ethical, Social, Political issues, Five moral dimensions of the Information Age, Ethical analysis, Candidate Ethical Principles

IT Infrastructure & Emerging Technologies – Evolution, Components, management issues, contemporary hardware platform trends, contemporary software platform trends, Web services and service-oriented architecture

Foundations of Business Intelligence – File organization terms and concepts, Capabilities of Database management Systems, Analytical tools, Databases design, managing data resources

Unit-III

Telecommunications, Internet and Wireless Technology – Networking and communication trends, signals, types of networks, internet services and communications tools, Wireless computer networks and internet access

Securing Information Systems – Malicious Software: Viruses, worms, Trojan horses, spyware, Hackers and computer crime, Internal threats, Business value of security and control: Legal and Regulatory requirements for Electronic records management, Establishing a framework for security and control: Risk assessment, Security policy, technologies and tools for protecting information resources.

Unit-IV

Enterprise Information System - Achieving Operational Excellence and Customer Intimacy: Enterprise system, Applications, Business values of Enterprise systems, Supply chain management system: Supply chain, Global supply chain, customer relationship management: Operational and Analytical CRM, Business value of Customer relationship management systems, Enterprise applications: New opportunities and challenges

Managing Knowledge – Important dimensions of knowledge, types of knowledge management systems, requirements of knowledge work systems, expert systems

Unit-V

Enhancing Decision Making – Business value of improved decision making, types of decisions, decision-making process, Business intelligence, decision support for operational and middle management, decision support for senior management, group decision support systems, modeling and designing systems: structured and object oriented methodologies, Alternative systems building approaches, Application development for the digital firm.

Project management – Runaway projects and system failure, project management objectives, importance of project management, linking systems projects to the Business plan, Information system costs and benefits, dimensions of project risk, change management and the concept of implementation, controlling risk factors, project management software tools

Textbooks and References:

1. Management Information Systems, Laudon and Laudon, 7th Edition, Pearson Education Asia.
2. Management Information Systems, Jawadekar, Tata McGraw Hill.
3. Management Information Systems, Davis and Olson, Tata McGraw Hill.
4. Analysis and Design of Information Systems, Rajaraman, Prentice Hall.
5. Decision Support Systems and Intelligent Systems, Turban and Aronson, Pearson Education Asia.
6. Management Information Systems, Schulthesis, Tata McGraw Hill.
7. Management Information Systems - Sadagopan, Prentice Hall.
8. Management Information Systems – Jayant O

Course Outcomes

CO1. **Apply** basic concepts of Information Technology, its support and role in Management, for managers

CO2. **Recognize** security aspects of IT in business, highlighting electronic transactions, advanced security features

CO3. **Analyze** managerial decision-making and to develop perceptive of major functional area of MIS

CO4. **Describe** emerging MIS technologies like ERP, SCM and trends in enterprise applications.

CO5. **Translate** the role of information systems in organizations, the strategic management processes, with the implications for the management.

CO6. **Apply** various information systems like DBMS together to accomplish the information objectives of an organization in Business Management

Data Mining and Warehousing

680313

Objectives:

1. To introduce and understand the basic concepts of Data Warehouse and Data Mining principles and techniques.
2. To identify the scope and necessity of Data Mining & Warehousing for the society.
3. To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems
4. To describe the designing of Data Warehousing so that it can be able to solve the root problems.
5. To Develop skills to write queries using DMQL
6. To examine the types of the data to be mined and apply preprocessing methods on raw data.
7. To discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
8. To understand various tools of Data Mining and their techniques to solve the real time problems.
9. To Develop and apply critical thinking, problem-solving, and decision-making skills.
10. To Introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modelling, and identifying new trends and behaviours.

UNIT-I

Data Warehouse Basic: Data warehousing Definition, usage and trends, DBMS vs data warehouse, statistical databases vs. data warehouses. Data marts, Metadata, Multidimensional data model, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations.

UNIT-II

Storage and Architecture of Data Warehouse: Data warehouse process & architecture, OLTP vs. OLAP, ROLAP vs. MOLAP types of OLAP, servers, 3 – Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager, data consolidation, warehouse internals, storage and indexing, Operations, materialized , online analytical processing(OLAP) systems

UNIT-III

Data Mining Basic: Data mining definition & task, KDD versus data mining, tools and applications. Data mining query languages, Preprocessing, pattern presentation & visualization specification, data mining techniques, tools and applications

Data mining techniques: Statistical perspective, Regression, Bayes Theorem, Hypothetical testing.

UNIT-IV

Classification and Clustering: Issues in classification, Statistical –Based Algorithms, Distance–Based Algorithms, Decision Tree–Based Algorithms, ID3,C4.5, Evaluating the performance.

Clustering: Basic concepts, Partition algorithms, Agglomerative Hierarchical algorithms, DBSCAN, BIRCH, CURE algorithm. Clustering with categorical attributes, Comparison.

UNIT-V

Association Rules: Frequent Itemset generation, Apriori Algorithm. Rule generation, Compact representation of frequent Itemset.

Advanced Topics: Dimensionality Reduction, overview of Principle Component Analysis and SVD. Spatial mining. Web mining. Temporal mining.

Books:

1. Jiawei Han & Micheline Kambe :Data Mining – Concepts & Techniques;
2. Margaret H. Dunham, S. Sridhar:Data Mining Introductory and Advanced Topics
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining
4. Kimball R, Reeves L , Ross M etc – Data Warehouse life cycle tool kit, John Wiley
5. Anahory: Data Warehousing in Real World, Addision Wesley
6. Adriaans: Data Mining, Addision Wesley.
7. JayeeBischaff& Ted Alexender : Data Warehouse: Practical advice from the Expert, Prentice Hall, New jursey.

Outcomes:

Student would be able to

CO1: **Describe** the basics of data warehouse, it's storage fundamentals and knowledge discovery in databases

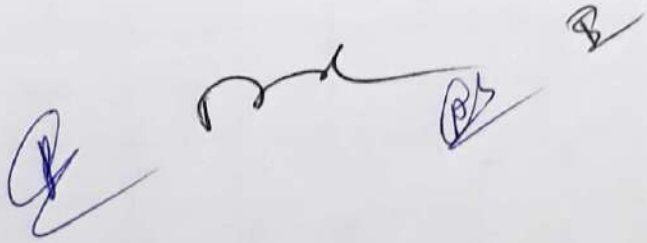
CO2: **Discuss** the storage and architectures of the data warehouse and it's operations.

CO3: **Apply** the basics of data mining and it's techniques to various real life problems.

CO4: **Analyze** classification and clustering algorithms and concepts

CO5: **Select** appropriate DM tools for clustering, association, and classification problems

CO6: **Explore** recent trends in data mining such as web mining, spatial-temporal mining



Madhav Institute of Technology & Science Gwalior (M.P.) Annexure-IV

Scheme of Examination

First Semester- Master of Computer Applications

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680101	SAD and Software Engineering	3	1	-	4	70	20	10		-	100
2.	680102	Mathematical Foundation of Computer Science	3	1	-	4	70	20	10	-	-	100
3.	680103	Programming and Problem Solving in C	3	1	-	4	70	20	10	-	-	100
4.	680104	Computer Organization and Assembly Language Programming	3	1	-	4	70	20	10	-	-	100
5.	680105	Communication Skills	3	1	-	4	70	20	10	-	-	100
6.	680106	Programming Laboratory in C	-	-	8	8	-	-	-	120	80	200
7.	680107	Assembly Language Programming Laboratory	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

Admitted July-2019

Madhav Institute of Technology & Science Gwalior (M.P.) Annexure-IV

Scheme of Examination

Second Semester- Master of Computer Applications

S No	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Pracical Slot)		Total Marks
			L	T	P		End Sem Exam	Tests (Two)	Assign ments /Quiz	End Sem Practical/ Viva	Practical Record/As signment/ Quiz/Pres entation	
1	680201	Multimedia Systems	3	1	-	4	70	20	10	-	-	100
2	680202	Computer Graphics	3	1	-	4	70	20	10	-	-	100
3	680203	Data Structures	3	1	-	4	70	20	10	-	-	100
4	680204	Computer Oriented Numerical & Statistical Methods	3	1	-	4	70	20	10	-	-	100
5	680205	Accounting & Management Control	3	1	-	4	70	20	10	-	-	100
6	680206	Data Structures Programming Laboratory	-	-	8	8	-	-	-	120	80	200
7	680207	Programming Laboratory In Computer Graphics	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

Admitted July-2019

Madhav Institute of Technology & Science Gwalior (M.P.) **Annexure-IV**

Scheme of Examination

Third Semester- Master of Computer Applications

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam.	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record/As signment/ Quiz/Pres entation	
1.	680301	Computer Oriented Optimization	3	1	-	4	70	20	10	-	-	100
2.	680302	Operating System	3	1	-	4	70	20	10	-	-	100
3.	680303	Object Oriented Methodology & C++	3	1	-	4	70	20	10	-	-	100
4.	680304	Database Mgmt. System	3	1	-	4	70	20	10	-	-	100
5.	680305	Managerial Economics	3	1	-	4	70	20	10	-	-	100
6.	680306	Minor Project-I (VB+MySql)	-	-	8	8	-	-	-	120	80	200
7.	680307	C++ Programming Laboratory	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

Admitted July-2019

Madhav Institute of Technology & Science Gwalior (M.P.) **Annexure-IV**

Scheme of Examination

Fourth Semester- Master of Computer Applications

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam.	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record/Assignment/ Quiz/Presentation	
1.	680401	Theory of Computation	3	1	-	4	70	20	10	-	-	100
2.	680402	Artificial Intelligence and Machine Learning	3	1	-	4	70	20	10	-	-	100
3.	680403	Unix and Shell Programming (Elective - I)	3	1	-	4	70	20	10	-	-	100
4.	680404	Java Programming and Technologies	3	1	-	4	70	20	10	-	-	100
5.	680405	Computer Networks and Communication	3	1	-	4	70	20	10	-	-	100
6.	680406	Minor Project-II (Java and My-SQL)	-	-	8	8	-	-	-	120	80	200
7.	680407	Programming Laboratory in Unix and Shell Programming	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

Admitted July-2019

Madhav Institute of Technology & Science Gwalior (M.P.) **Annexure-IV**

Scheme of Examination

Fifth Semester- Master of Computer Applications

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem Exam	Tests (Two)	Assignments /Quiz	End Sem Practical/ Viva	Practical Record/Assignment/ Quiz/Presentation	
1.	680501	Analysis and Design of Algorithms	3	1	-	4	70	20	10	-	-	100
2.	680502	Network and Cyber Security	3	1	-	4	70	20	10	-	-	100
3.	680503	Web Technologies and Cloud Computing	3	1	-	4	70	20	10	-	-	100
4.	680504	Elective-I (.NET Technologies and C#)	3	1	-	4	70	20	10	-	-	100
5.	680505	Elective –II (Data Warehousing and Mining)	3	1	-	4	70	20	10	-	-	100
6.	680506	Minor Project-III Web Based Application Using .NET	-	-	8	8	-	-	-	120	80	200
7.	680507	Programming Laboratory in PHP and Web Technologies	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

Admitted July-2019

Madhav Institute of Technology & Science Gwalior (M.P.) Annexure-IV

Scheme of Examination

Sixth Semester- Master of Computer Application

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (SESSIONAL)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P				Sessional	Project viva	Project Seminar	
1.	680601	System Development Project	-	-	-	20	-	-	200	200	100	500
		Total	-	-	-	20	-	-	200	200	100	500

L: Lecture - T: Tutorial - P: Practical

Admitted July-2019

Annexure-V

680322 MINOR PROJECT

Introduction to PHP - Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression

HTML - Introduction to HTML, HTML Tags, Creating Forms, Creating tables, Managing home page

CSS - Introduction to CSS, Three ways to use CSS, CSS Properties, Designing website, Working with Templates

Java Script - Introduction to Javascript, Ways to use Javascript, Working with events, Client-side Validation

Database Connectivity with MySql - Introduction to DBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query, Join (Cross joins, Inner joins, Outer Joins, Self joins.)

Proposed list of projects

1. Banking management system
2. Eye Bank management
3. Online shopping
4. Blood bank management system
5. NCC management system
6. Restaurant management system
7. E-parking
8. Flight Booking management system
9. Hospital management system
10. Exam database management system

Annexure-V

680323 PROGRAMMING LAB IN PYTHON

OBJECTIVES:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

. Import and use use basic libraries like numpy and pandas

. Implement programs using these basic libraries

LIST OF PROGRAMS

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Read/write data from a file
14. Makea a program to plot the data from files

PLATFORM NEEDED
Python 3 interpreter for Windows/Linux

Madhav Institute of Technology and Science, Gwalior

Annexure-VI

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Computer Science & Engineering

MCA

CO Attainment, Gap Analysis and Action Taken (Session: July-Dec. 2020 Semester)

Semester3

Course Name		Course outcomes	CO Direct Attainm	CO Indirect Attainment %	Total Attainm	Target	Gap	Action Taken
Programming in Python 680301	CO1	Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in	73.33	90	**76.66**	60	-	No action needed
	CO2	Express different Decision Making statements and Functions	90.3	90	**90.24**	65	-	
	CO3	Interpret Object oriented programming in Python	63.33	90	**68.66**	60	-	
	CO4	Understand and summarize different File handling & Database operations	76.67	88	**78.94**	60	-	
	CO5	Explain how to design GUI Applications in Python and evaluate different database	76.67	86	**78.54**	60	-	
	CO6	Design and develop Client Server network applications using Python	90	82	**88.4**	75	-	
Operating System 680302	CO1	Evaluate and compare different structures for operating systems	93.33	90.00	**92.66**	65	-	No action needed
	CO2	Analyze theory and implementation of: processes, resource control (concurrency etc.)	100	90.00	**98.00**	65	-	
	CO3	Distinguish system calls for managing processes, memory and the file system.	88.33	84.00	**87.46**	65	-	
	CO4	Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Dis	85	84.00	**84.80**	65	-	
	CO5	Apply the various resource management techniques for distributed systems	93.33	84.00	**91.46**	65	-	
	CO6	Discover the different features of real time and mobile operating systems	90	84.00	**88.80**	65	-	
680303 Object oriented Methodology &	CO6	Describe OOPs fundamental	96.67	84	**94.14**	60	-	No action needed
	CO2	Explain basic characteristics of C++ such as composition of class, objects, arrays, oper:	96.67	84	**94.14**	65	-	
	CO3	Demonstrate adeptness of object oriented programming in developing solutions to prob	96.67	82	**93.74**	60	-	
	CO4	Investigate object oriented programming to develop solutions demonstrating usage of n	96.67	82	**93.74**	60	-	
	CO5	Evaluate existing classes to develop C++ classes for required software applications	93.33	84	**91.46**	60	-	
	CO6	Design the solution for societal beneficiary problems using C++ features and the Stand.	90	84	**88.8**	75	-	
Database Management System 680304	CO1	Differentiate database systems from file systems by enumerating the features provided	96.67	85	**94.34**	60	-	No action needed
	CO2	Define the terminology, features, classifications, and characteristics embodied in datab:	93.33	85	**91.66**	65	-	
	CO3	Design principles for logical design of databases, including the E-R method and norma	100	86	**97.2**	60	-	
	CO4	Evaluate database storage structures and access techniques	96.67	76	**92.54**	60	-	
	CO5	Identify the issues of transaction processing and concurrency control.	96.67	86	**94.54**	60	-	
	CO6	Analyze an information storage problem and derive an information model expressed in	96.67	82	**93.74**	75	-	

Semester5

Managerial Economics 680305	CO1	To develop an understanding of management and its uses in day to day life.	100	77.4	95.48	60	-	
	CO2	The aware students about each and functions of management and to understand the abil	100	75	95	65	-	
	CO3	Develop an understanding of professional and ethical responsibilities so as to analysear	100	80	96	60	-	No action needed
	CO4	To relate the subjects of arts and management in engineering and allied fields	100	78	95.6	60	-	
	CO5	An understanding as to how management helps a student to understand, adjust and adap	100	80	96	60	-	
	CO6	Enhance the understanding of economics and its impact on organization	100	80	96	75	-	
Analysis and Design of Algorithms 680501	CO1	Apply the algorithms and design techniques to solve problems;	89	90.6	89.32	60	-	
	CO2	Demonstrate how the worst-case time complexity of an algorithm is defined;	87	90.6	87.72	65	-	
	CO3	Analyze and compare the efficiency of algorithms using time and space complexity the	90	89.41	89.88	60	-	No action needed
	CO4	Prove the correctness and analyze the running time of the basic algorithms for those cla	95	89.41	93.88	60	-	
	CO5	Demonstrate a number of standard algorithms for problems in fundamental areas in con	82	91.76	83.95	60	-	
	CO6	Apply prior knowledge of standard algorithms to solve new problems, and mathematics	75	90.59	78.12	75	-	
Network and Cyber Security 680502	CO1	Discuss various cyber security policies, Act's , laws used to protect society from cyber	71.67	7.89	71.67	60	-	
	CO2	Demonstrate needs for information security and security risk analysis to combat agair	80	80	80	65	-	
	CO3	Identify various algorithms and techniques used to enhance digital security for societal	91.67	7.89	91.67	60	-	
	CO4	Analyze functions of various security protocols and model to ensure security over the	95	7.89	95	60	-	No action needed
	CO5	Evaluate mechanism of various encryption and decryption algorithms to ensure messag	90	7.94	90	60	-	
	CO6	Create cipher text and decrypt into plaintext using various ciphers generating algorithm	73.33	8.11	73.33	75	1.67	
Web Technologies and Cloud Computing	CO1	Deploy onto the cloud infrastructure customer-created or customer-acquired applicatio	93.33	83.08	91.28	60	-	
	CO2	Effectively manage increasing risk, including security, compliance, projects and partne	100	82.56	96.51	65	-	
	CO3	Communicate clear enterprise objectives internally and third parties	88.33	83.59	87.38	60	-	No action needed
	CO4	Flexibility, scalability and services are changed in the cloud, enabling the enterprise an	85	81.54	84.31	60	-	
	CO5	Identify the desired business goals beyond capabilities of current IT, which is essential	93.33	82.05	91.07	60	-	
	CO6	Quantify the gains envisioned in a cloud application.	98.33	82.05	95.07	75	-	
.NET Technologies & C# 680504	CO1	Understand code solutions and compile C# projects within the .NET framework.	78.33	83.13	79.29	60	-	
	CO2	Design and develop professional console and window based .NET application	88.33	84.38	87.54	65	-	
	CO3	Demonstrate knowledge of object-oriented concepts Design user experience and functi	75	83.13	76.63	60	-	
	CO4	Construct classes, methods, and assessors, exception handling and instantiate	85	81.25	84.25	60	-	No action needed
	CO5	Create and manipulate GUI components in C#.	76.67	79.38	77.21	60	-	
	CO6	Design and Implement database connectivity using ADO.NET in window and web base	81.67	81.25	81.59	75	-	
Data Warehousing and Mining 680505	CO1	Describe the basics of data warehouse, it's storage fundamentals and knowledge discov	83.33	78.29	82.32	70	-	
	CO2	Discuss the storage and architectures of data warehouse and it's operations.	93.33	77.71	90.21	70	-	
	CO3	Apply the basics of data mining and it's techniques	96.67	78.29	92.99	65	-	
	CO4	Analyze classification and clustering algorithms, concepts for various real time problen	95	76.57	91.31	70	-	No action needed
	CO5	Select appropriate DM tools and methods for clustering, association, and classification	93.33	77.14	90.09	65	-	
	CO6	Explore recent trends in data mining such as web mining, spatial-temporal mining	85	75.43	83.09	70		

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR

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Department of CSE

COURSE CURRICULUM FEEDBACK (July-Dec 2020)

Parameter(Average Grading)						1. The course is well designed	2. The syllabus units are balanced	3. The learning material was available to you	4. The content was clear and easy to understand	5. The course was relevant and updated for present needs	6. The course meets your career expectations	7. The course will be useful to meet your higher studies/future aspirations
Sr.No	Subject Code	Subject Name	Semester	Section / Branch	Faculty Name							
1	[illegible]	Mathematical Foundations	1	MCA	Prof. S. K. Mishra							
2	[illegible]	Data Structures and Algorithms	1	MCA	Dr. Anshu Chaturvedi	4.77	4.72	4.63	4.68	4.7	4.72	4.75
3	[illegible]	Database Management Systems	1	MCA	Dr. Parul Saxena	4.73	4.5	4.58	4.68	4.63	4.79	4.71
4	[illegible]	Operating Systems	1	MCA	Dr. R.S. Jadon	4.55	4.45	4.73	4.63	4.68	4.74	4.61
5	[illegible]	Management Functions and Ord. B.	1	MCA	Dr. Sanjeev Kharna	4.58	4.47	4.58	4.58	4.58	4.68	4.63
6	[illegible]	Python Programming	1	MCA	Prof. Prabhakar Sharma	4.53	4.45	4.53	4.74	4.58	4.79	4.71
7	[illegible]	Operating Systems	3	MCA	Dr. R.S. Jadon	4.7	4.63	4.81	4.72	4.81	4.72	4.72
8	[illegible]	Object Oriented Programming	3	MCA	Dr. Anshu Chaturvedi	4.2	4.1	3.8	4	4.2	3.9	3.9
9	[illegible]	Database Management Systems	3	MCA	Dr. Parul Saxena	3.75	3.63	3.5	3.75	3.5	3.75	3.63
10	[illegible]	Managerial Economics	3	MCA	Dr. Namrata Gupta	3.41	3.41	3.2	3.6	3.41	3.41	3.41
11	[illegible]	Analysis and Design of Algorithms	5	MCA	Dr. R.S. Jadon	2.9	2.8	3	2.9	3	2.8	2.8
12	[illegible]	Network and Cyber security	5	MCA	Dr. Anshu Chaturvedi	4.2	4.1	3.8	4	4.2	3.9	3.9
13	[illegible]	Web Technologies and Cloud Computing	5	MCA	Dr. Parul Saxena	3.77	3.69	3.2	3.94	3.44	3.63	3.54
14	[illegible]	Elective I (.NET Technologies & OR)	5	MCA	Prof. Prabhakar Sharma	3.94	3.88	3.76	3.94	3.53	3.76	3.88
15	[illegible]	Elective II (Data Warehousing and Mining)	5	MCA	Dr. Anshu Chaturvedi	3.78	3.69	3.66	3.9	3.63	3.72	3.84
						3.94	3.72	3.76	4.05	4.16	4.22	3.76

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Madhav Institute of Technology & Science, Gwalior **Annexure-VIII**

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Department of Computer Science and Engineering

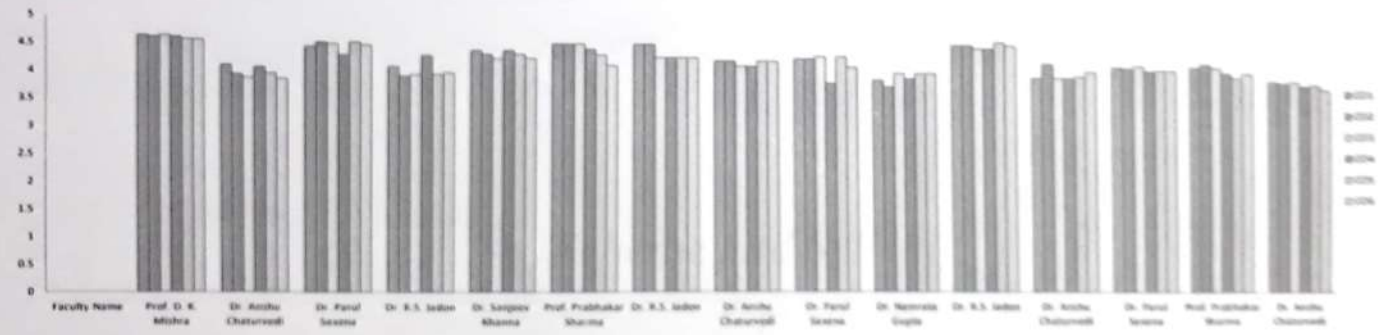
COURSE OUTCOMES FEEDBACK (July-Dec 2020)

Parameters for the feedback: Average: 3pts; Agree: 4pts; Strongly Agree: 5pts

Feedback was taken on 5 point scale; Target set for each course = 4 (Agree)

FACULTY CO FEEDBACK (July-Dec 2020)

Sr. No.	Subject Code	Subject Name	Semester	Section/branch	Faculty Name	CO1	CO2	CO3	CO4	CO5	CO6	Overall CO	Gap
1	680111	Mathematical Foundations	1	MCA	Prof. D. K. Mishra	4.65	4.62	4.65	4.62	4.58	4.58	4.62	0
2	680112	Data Structures and Algorithms	1	MCA	Dr. Anshu Chaturvedi	4.12	3.95	3.89	4.08	3.97	3.87	3.98	0.02
3	680113	Database Management Systems	1	MCA	Dr. Parul Saxena	4.45	4.53	4.5	4.3	4.53	4.48	4.47	0
4	680114	Operating Systems	1	MCA	Dr. R.S. Jadon	4.09	3.91	3.94	4.29	3.94	3.97	4.02	0
5	680115	Management Functions and Oral & Written	1	MCA	Dr. Sanjeev Khanna	4.38	4.31	4.23	4.38	4.31	4.23	4.31	0
6	680301	Python Programming	3	MCA	Prof. Prabhakar Sharma	4.5	4.5	4.5	4.4	4.3	4.1	4.38	0
7	680302	Operating Systems	3	MCA	Dr. R.S. Jadon	4.5	4.5	4.25	4.25	4.25	4.25	4.33	0
8	680303	Object Oriented Programming	3	MCA	Dr. Anshu Chaturvedi	4.2	4.2	4.1	4.1	4.2	4.2	4.17	0
9	680304	Database Management Systems	3	MCA	Dr. Parul Saxena	4.25	4.25	4.3	3.8	4.3	4.1	4.17	0
10	680305	Managerial Economics	3	MCA	Dr. Namrata Gupta	3.87	3.75	4	3.9	4	4	3.92	0.08
11	680501	Analysis and Design of Algorithms	5	MCA	Dr. R.S. Jadon	4.53	4.53	4.47	4.47	4.59	4.53	4.52	0
12	680502	Network and Cyber security	5	MCA	Dr. Anshu Chaturvedi	3.94	4.2	3.94	3.94	3.97	4.06	4.01	0
13	680503	Web Technologies and Cloud Computing	5	MCA	Dr. Parul Saxena	4.15	4.13	4.18	4.08	4.1	4.1	4.12	0
14	680504	Elective-I (NET Technologies & C#)	5	MCA	Prof. Prabhakar Sharma	4.16	4.22	4.16	4.06	3.97	4.06	4.11	0
15	680505	Elective-II (Data Warehousing and Mining)	5	MCA	Dr. Anshu Chaturvedi	3.91	3.89	3.91	3.83	3.86	3.77	3.86	0.14



MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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ANNEXURE – IX

Scheme and Syllabi

for

Two Year M.C.A. Programme

[ITEM 11(b)]

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Guidelines / Abbreviations for Two Years MCA Programme (Effective from July 2020)

Abbreviations used

L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
DC	Departmental Core
DE	Departmental Elective
BM	Business Management
OC	Open Category
DLC	Departmental Laboratory Courses
MOOC	Massive Open Online Courses

Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
2 Hours Practical(Lab)/week	2 credits

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Master of Computer Applications (MCA) (2 Year Programme) (Semester – I)

To be admitted in July 2021 Batch (Same scheme for July 2020 Admitted Batch

Scheme of Examination

S. No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam		L	T	P	
1.	BSC	680111	Mathematical Foundations	70	20	10	-	-	-	-	100	3	-	-	3
2.	DC	680112	Data Structures and Algorithms	70	20	10	-	-	-	-	100	3	1	-	4
3.	DC	680113	Database Management Systems	70	20	10	-	-	-	-	100	3	1	-	4
4.	DC	680114	Operating Systems	70	20	10	-	-	-	-	100	3	1	-	4
5.	BM	680115	Management Functions and Oral & Written Communication	70	20	10	-	-	-	-	100	3	-	-	3
6.	DLC	680116	Lab-I (Object Oriented Programming Lab)	-	-	-	90	60	-	-	150	-	-	6	6
7.	DLC	680117	Lab-II (DBMS Lab)	-	-	-	60	40	-	-	100	-	-	2	2
			Total	350	100	50	150	100	-	-	750	15	3	8	26

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Master of Computer Applications (MCA) (2 Year Programme) (Semester-II) ***To be admitted in July 2021 Batch***

Scheme of Examination

S. No.	Course Category	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam		L	T	P	
1.	DC	680211	Software Engineering	70	20	10	-	-	-	-	100	3	1	-	4
2.	DC	680212	Internet of Things (IoT)	70	20	10	-	-	-	-	100	3	1	-	4
3.	DC	680213	Computer Networks	70	20	10	-	-	-	-	100	3	1	-	4
4.	DE-1	DE	Departmental Elective-I	70	20	10	-	-	-	-	100	3	-	-	3
5.	DE-2	DE	Departmental Elective-II	70	20	10	-	-	-	-	100	3	-	-	3
6.	DLC	680223	Lab-III (Java Programming Lab)	-	-	-	90	60	-	-	150	-	-	6	6
7.	DLC	680224	Lab-IV (Business Programming Laboratory	-	-	-	60	40	-	-	100			2	2
			Total	**350**	**100**	**50**	**150**	**100**	-	-	**750**	**15**	**3**	**8**	**26**

Elective-I course *will run through Department List of Electives, as decided by respective BoS / Department. Moreover, this may also be run through SWAYAM/NPTEL/MOOC based Learning Platform (with credit transfer facility) (if required) to address the technological advancements and diverse application orientation. The need is to be assessed by the department/BoS.*
Elective-II course *will run through Department List of Electives (for Business Management and IT oriented courses), as decided by BoS / Department. List of Electives will remain dynamic and may be kept updated, considering the industrial demand / current practices.*

DE-1 (Tentative)	
Subject Code	**Subject Name**
680214	Computer Architecture and Organization
680216	Web Technology
680217	Machine Learning with Python

DE-2	
Subject Code	**Subject Name**
680218	Managerial Economics
680219	Corporate Planning
680215	Computer Graphics and Multimedia
680223	Unix and Shell Programming

Annexure-X

Department of Computer Science and Engineering

Master of Computer Applications

(Two Year Programme)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR – 474005
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Department of Computer Science & Engineering

Master of Computer Applications (Two Year Programme)
First Semester

Mathematical Foundations
680111
(BSC)

Objective:

- To understand the basic discrete mathematical structures
- To develop understanding of Boolean mathematics
- To understand recurrence relations and its usage in computer science

UNIT-I

Sets Relations and Functions: Sets, Subsets, Power-Sets, Complement, Union and intersection. Demorgan's law Cartesian, products, Relations: relational Matrices, properties of relations, equivalence relation Functions: Injection, Surjection, Bijection, Composition of Functions, Permutations. Cardinality, the characteristic functions and Mathematical induction..

UNIT-II

Lattices: Partial order set, Hasse diagrams, upper bounds, lower bounds, Maximal and minimal element, first and last element ,Lattices, sub lattices , Isotonicity, distributive inequality lattice homomorphism, lattice isomorphism, complete lattice, complemented lattice distribution lattice

UNIT-III

Groups and Fields: Groups: Group axioms-permutation groups, Subgroups, Co-sets, Normal Subgroups, semi groups; Lagrange theorem, fields, minimal polynomials, reducible polynomials, primitive polynomial roots, applications

UNIT-IV

Graphs: Finite graphs, incidence and degree, isomorphism, subgraphs and union of graphs, Connectedness, Walks paths and circuits Eulerian graphs: Trees properties of trees, pendant vertices in a tree, Center of tree Spanning trees and Cutvertices, Binary tree Matrix representation of graph, Incidence, Adjacency matrices and their properties. Applications of graphs in Computer Science

UNIT-V

Discrete Numeric function and Recurrence relation: Introduction to discrete numeric functions and generating functions introduction to recurrence relations and recursive algorithms. Linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions.

Books:

1. J.P.Trembley & R.P.Manohar. "Discrete Mathematical Structure with applications to Computer Science

2. Nersingh Deo: Graph Theory. :: C.L. Liu Discrete Mathematics.

3. C.L. Liu: Discrete Mathematics

4. D.K. Jain: Discrete Structures

Course outcomes:

Student would be able to

CO1: Understand the basic concept of set theory, lattices, graph theory, discrete numeric function and algebraic structure.

CO2: Describe basic knowledge of course content and distinguish between them in terms of their applications.

CO3: Implement the course content to related engineering applications and problems faced in real life.

CO4: Apply the concepts of mathematics to the suitable technique for relevant industries and contribution to the society

CO5: Analyze the set theory, lattices, graph theory, discrete numeric function and algebraic structure to examine the real world problem.

CO6: Design analytical skills and interpret applications of engineering beneficial in real time troubleshooting.

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Data Structures and Algorithms
680112
(DC-1)

Objective:

- To understand the abstract data types stack, queue, deque, trees, lists etc.
- To be able to design efficient algorithms using various data structures.
- To understand design techniques the time complexity of algorithms.

UNIT-I

Prerequisites: Array, Structure, pointers, pointer to structure, functions, parameter passing, recursion.

Stack and Queue: contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue-operations

UNIT-II

General List: list and it's contiguous implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.

Time Complexity: models of computation, algorithm analysis, order architecture, time space complexities, computing the average and worst case analysis.

UNIT-III

Trees: definitions-height, depth, order, degree, parent and children relationship etc; Binary Trees- various theorems, complete binary tree, almost complete binary tree; Tree traversals-preorder, inorder and post order traversals, their recursive and non recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition. Miscellaneous features Basic idea of AVL tree- definition, insertion
; deletion operations; basic idea of B-tree- definition, order, degree, insertion; deletion operations; B-tree- definitions, comparison with B-tree; basic idea of string processing.

UNIT-IV

Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaining; sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

UNIT-V

Graphs: Overview, related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search, Minimum spanning tree; shortest path algorithm; kruskal, dijkstra algorithm.

Books:

1. Theory and Problems of Data Structures, Seymour Lipschutz,Schaum'S Outline Series, McGraw Hill.
2. Kruse R.L. Data Structures and Program Design in C; PHI
3. TennenBaum A.M. & others: Data Structures using C & C++; PHI
4. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.
5. Ullman, Analysis and Design of Algorithm; TMH
6. Goodman "Introduction to the Design & Analysis of Algorithms, TMH-2002.
7. Sara Basse, A. V. Gelder, " Computer Algorithms," Addison Wesley
8. T. H. Cormen, Leiserson , Rivest and Stein, "Introduction of Computer algorithm," PHI

Course Outcomes:

Student would be able to

CO1: **Discuss** the basics of data structures

CO2: **Design** various linear and non-linear data structures available

CO3: **Describe** several sorting algorithms including quick sort, merge sort and heap sort

CO4: **Organize** some graph algorithms such as shortest path and minimum spanning tree

CO5: **Analyze** the complexity of various algorithms for different data structures

CO6: **Evaluate** different data structure techniques for real world problems

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Database Management Systems
680113
(DC-2)

Objectives:

- To describe key concepts, issues, and operational terminology
- To understand the relationships of key components behind concepts such as hardware, networks, data storage, operating systems, and software programs.
- To normalize any problem using 1^{st},2^{nd},3^{rd},4^{th},5^{th} normal form

UNIT-I

Introduction: Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture.

ER model: basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

UNIT-II

Domains, Relations and Keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.

Relational Algebra & SQL: The structure, relational algebra with extended with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL.

UNIT-III

Functional Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form.

UNIT-IV

Transaction, concurrency and Recovery: basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints.

UNIT-V

Distributed Database: basic idea, distributed data storage, data replication, data fragmentation- horizontal vertical and mixed fragmentation

Storage structure and file organizations: overview of physical storage media, magnetic disks-performance and optimizations, basic idea of RAID, file organizations, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization.

Books:

1. Database System Concepts – A Silberschatz, H.F Korth, Sudersan, MGH Publication.
2. An introduction to Database Systems – C.J Date 6^{th} ed

3. Fundamentals of Database systems – L elmasri & Navathe III ed.
4. An introduction to Database systems – B.C. Desai.

Course Outcomes:

Student would be able to

CO1: **Differentiate** database systems from file systems by enumerating the features provided by database systems and execute various SQL queries

CO2: **Define** the terminology, features, classifications, and characteristics embodied in database systems.

CO3: **Design** principles for logical design of databases, including the E-R method and improve the database design by normalization.

CO4: **Evaluate** the principles of storage structure and recovery management.

CO5: **Identify** the issues of transaction processing and concurrency control.

CO6: **Analyze** an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary, file and page organizations, indexing methods including B tree, and hashing. .

Operating Systems
680114
(DC-3)

Objectives:

- To learn the fundamentals of Operating Systems.
- To understand the intrinsic of basic services provided by the operating system like process management, processor management, memory management, devioce management and information management..
- To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols

UNIT-I

Introduction: Evolution of operating systems, Types of operating systems, Different views of operating system, operating system concepts and structure.

Processes: The process concept, systems programmer's view of processes, operating system services for processes management, scheduling algorithms, Performance evaluation.

UNIT-II

Memory Management: Memory management without swapping or paging , swapping , virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging system, segmentation.

UNIT-III

Interprocess communication and synchronization: The need for interprocess synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problems in concurrent programming, critical region and conditional critical region, monitors messages.

UNIT-IV

Deadlocks: Deadlock prevention, deadlock avoidance.

File system: File systems, directories, file system implementation security and protection mechanism.

Input/Output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access, Principles of I/O software: Goals interrupt handlers, device drivers, and device independent I/O software, User space I/O software.

UNIT-V

Disks: Disk hardware, scheduling algorithms, Error handling, track-at-a time caching RAM disk.

Clocks: clock hardware, memory mapped terminals, I/O software

Distributed file system: Design, implementation and trends.

Performance measurement: monitoring and evaluation introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.

Case studies: MS-DOS, MS Windows and Linux(Unix) Operating System.

Books:

1. Deitel "An introduction to operating systems". Addison Wesley Publishing Company 1984.
2. Milenkovic M. "Operating Systems – concepts and design" McGraw Hill International Edition – Computer science series 1992.

3. Peterson, Silberschatz. "Operating System Concepts". Addison Wesely Publishing Company, 1989.
4. Tanenbaum A.S. "Modern Operating System" Prentice Hall of India Pvt Ltd 1995.

Course Outcomes:

Student would be able to

CO1: **Evaluate** different structures for operating systems
CO2: **Analyze** theory and implementation of: processes, resource control (concurrency etc.)
CO3: **Distinguish** system calls for managing processes, memory and the file system.
CO4: **Demonstrate** the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
CO5: **Apply** the various resource management techniques for distributed systems
CO6: **Discover** the different features of real time and mobile operating systems

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Management Functions and Oral & Written Communication
680115
(BM-1)

Course Objectives:

- The course intends to build the required spoken and written skills of the students so as to communicate effectively in real-life situations like starting a talk and be comfortable using English language.
- It aims at teaching students to appreciate English language through the study of scientific, creative, and academic text.
- The course is designed to acquaint students with structure of English language used in literature, functional varieties, figurative language, and verbal concomitance
- The students are expected to enrich their knowledge of language, culture, and ethics through this course.

Unit: 1 Communication

Communication: Meaning, Nature, Process, Elements of Communication, Importance of Effective Communication, Communication Situation, Barriers to Communication, Johari Window.

Verbal and Nonverbal Communication, Organisational Communication, Formal and informal communication, Grapevine Communication.

Unit: 2 Listening & Speaking

Listening & Speaking, Speak, Read and Write, Improving Communication Skills. Speaking: Presentation: Conducting, Visual and Audio-visual aids. Group Discussion. Meetings. Interview. Telephonic Conversations, Seminar, Debates, and Public Speaking.

Unit: 3 Reading

Reading: Essentials of reading, Skimming and Scanning passages. Reading stories, articles, prose and fiction. [with reference to following **three** Short Stories:

1. R K Narayan — *An Astrologer's Day*
2. Ernest Hemingway — *The Old Man at the Bridge*
3. James Joyce – *Araby*

Unit: 4 Writing

Writing: Mechanics of Writing. Paragraph Writing. Letters: Essentials of Writing Letters, Types of Official Letters, Letters of complaints enquiry, order, and Informative. Applications: Job Applications, Drafting Biodata.

Writing Reports: Mechanics of Report Writing, Types of Report, Technical Report, Organising a report Précis Writing,

Unit 5: Management Concept:

a. Meaning Characteristics and Importance of management, Difference and Relationship between Organization, Management, and Administration. Contribution of Henry Fayol and F W Taylor. Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management.

b. Motivation, and theories of Motivation by Maslow, Herzberg, McClelland, Ash.

c. Decision making: Steps of decision making.

Reference Books:

- *Communication Skills for Engineers* Pearson Education.
- *Understanding Human Communication by Rodman and Adler published by OUP.*
- *Technical Communication* Oxford University Press
- *Study Listening, Speaking Reading, Writing a series by Cambridge University Press.*
- *The Practice of Management* Peter Drucker Harper and Row

- *Essentials of Management: Koontz, Prentice Hall of India*
- *Principles of Management by Stephen P Robbins et. al.*

Course Outcomes: ***After successful completion of the course student will be able to***

CO1 Speak effectively and appropriately in a public forum to a variety of audiences and purposes. (LOT1)

CO2 Prepare presentations and arguments within the Engineering Profession effectively. (LOT2)

CO3 Demonstrate comprehension of traditions in language as well as its social, cultural, and historical context. (LOT3)

CO4 Relate management principles, processes and procedures in consideration of their effort on individual actions. (LOT3)

CO5 Infer day to day issues supplemented with interpretative skills achieved through management and communication. (HOT 5)

CO6 Implement professional work habits necessary for effective collaboration and cooperation with others. (HOT4)

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Object Oriented Programming Lab
680116
(DLC-1)

An overview: Algorithms & flowcharts; Characteristics of a good program. Rules/conventions of coding, documentation, naming variables; History of C; Structure of a C Program; Data Types; Constant & Variable;

Fundamentals of C Programming:; Operators & expressions. Priority & associatively of operators. loops and decisions , Control Constructs- if-else, for, while, do-while, Case statement; Arrays; Formatted & unformatted I/O, Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Special constructs-Break, continue, exit ()

Modular Programming: Functions; Arguments; Return Value; Parameter passing- call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, comparison with iteration, tail recursion, when to avoid recursion, examples.

OOP Overview and Fundamentals: Overview of object oriented programming, evolution, features, comparison with procedural languages, applications, advantages. C++ basics, data types, Operators, structures and functions, references.

Characteristics in Detail: Object and classes, object arrays, constructor and destructor functions, friend functions, inline functions Polymorphism: operator and function overloading,
Inheritance and it's types in detail, argument passing in case of various inheritance types.
Pointers and Run time polymorphism: Pointers, virtual base class, pointers to base and derived classes, pointers to members and member functions. generic pointers, generic functions and generic classes, virtual functions , early and late binding,

File Handling and I/Os: C++ I/O systems , formatted I/O , creating inserters and extractors, file I/O basic , creating disk file and file manipulation using seekg(), seekp(), tellg(), tellp() functions, exception handling.

Course Outcomes:
Students would be able to:

CO1: **Describe** OOPs fundamental
CO2: **Explain** basic characteristics of C++ such as composition of class, objects, arrays, operator overloads, inheritance and polymorphism etc.
CO3: **Demonstrate** adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, pointers, dynamic binding, templates and inheritance.
CO4: **Investigate** object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O file handling, encapsulation, and other standard language constructs
CO5: **Evaluate** existing classes for required software applications for societal needs
CO6: **Design** the solution for various problems using C and C++ features and the Standard Template Library, and test and evaluate the finished code.

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Database Management Laboratory
680117
(DLC-2)

Basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL. Creation of a database and writing SQL queries to retrieve information from the database. Performing insertion, deletion, modifying, altering, updating and viewing records based on conditions. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Creation of Views, Creating an Employee database to set various constraints. Creating relationships between the databases. Case Study using real life database applications.

Course outcomes:

Student would be able to

CO1: **Design** database application system as part of a team.
CO2: **Solve** queries using SQL
CO3: **Design** an information model expressed in the form of an entity relation diagram
CO4: **Adapt** normalization theory for a database.
CO5: **Implement** data definition language for the schema using a DBMS
CO6: **Construct** database application system solutions to a broad range of query problems.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR – 474005
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Master of Computer Applications (Two Year Programme)
Second Semester
680211
Software Engineering
(DC-4)

COURSE OBJECTIVES

- To understand the basic concepts of software engineering logical process modeling and operational terminology
- To understand the software process models
- To draw DFDs using specific rules and components to depict logical process models

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UNIT - I Introduction to Software Engineering:
Definition, Software Characteristics and Elements of system, The System Development Life Cycle, The Role of System Analyst. Types of Requirement- Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

UNIT - II Software Process Models:
Software, Software Myths, Software Engineering - A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Software Process Models, Fourth Generation Techniques

UNIT - III Design Concept, Principle and Methods:
Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Real Time Design, Object Oriented Design, Coupling and Cohesion, Risk analysis.

UNIT - IV Software Metrics, Project Management and Estimation:
Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, **Project Management-** Basics-People,Product, Process, Project, **Estimation-** Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques

UNIT - V Software Quality Assurance and Testing:
Definitions, Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Software Testing Life Cycle (STLC), Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing

RECOMMENDED BOOKS

- Software Engineering by Sommerville, Pearson
- Software Engineering, A Practitioner's Approach, by Roger S. Pressman, McGrawHill
- Software Engineering by K.K. Agrawal & Yogesh Singh, New Publication
- Software Engineering by Rajib Mall

COURSE OUTCOMES

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

CO1: Design and mapping of different real world problems using software engineering concepts

CO2: Evaluate software models with respect to their accuracy and needs of the customer requirement.
CO3: Design test cases and SQA of a software system.
CO4: Identify and how to use various cost estimation techniques used in software engineering.
CO5: 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
CO6: Evaluate as an effective member or leader of software engineering teams and manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals

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Internet of things
680212
(DC-5)

Unit I:

Introduction & Concepts: Introduction to Internet of Things, Architecture, Physical Design of IOT, Logical Design of IOT, Four Pillars of IoT, Applications, IOT Enabling Technologies, IOT components. Basics of Networking.

Unit II:

Sensors, actuators, types of sensors. IOT service oriented Architecture, IOT associated technologies , IOT Communication Protocols: IEEE 802.15.4, Zigbee,6LoWPAN,Wireless Hart, AMQP,MQTT,COAP,NFC, XMPP, SOAP, REST, HTTP Routing protocols.

Unit III

Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Introduction to Raspberry Pi, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino, Raspberry Pi & arduino devices.

Unit IV

Sensor Networks, Ubiquitous Computing,. data storage in IOT, IOT Cloud Based Services. Interoperability in IoT, cloud Computing, Fog Computing, Edge computing. Data Analytics overview.

Unit V:

Security and privacy in the internet of things: concepts , IoT security overview, security framework for IoT, Privacy in IOT networks, IoT Robustness and reliability ,Governing internet of things: issues , Approaches and new paradigms. IOT Case studies : Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Reference Books:

1. Rajkamal,"Internet of Things", Tata McGraw Hill publication

2. Vijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)" 1st Edition ,Universal Press

3. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication.

4. Charless Bell "MySQL for the Internet of things", Apress publications.

5. Francis dacosta "Rethinking the Internet of things:A scalable Approach to connecting everything", 1st edition, Apress publications 2013.

6. Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication.

Course Outcomes:

CO1: **Define** fundamentals of IoT, Enabling Technologies, Networking and Communication Protocols.

CO2: **Illustrate** the functions, applications of various IOT Protocols and architectures.

CO3: **Apply** networking knowledge in Domain Specific IOTs for societal benefits.

CO4: **Discover** technologies and theories involved in Sensor Networks, Machine-to-Machine Communications & Arduino Programming.

CO5: **Evaluate** the role of Security and privacy in the internet of things to provide solutions related to reliability and privacy for real world problems.

CO6: **Develop** IOT design methodologies using Python constructs and Raspberry Pi.

Computer Networks
680213
(DC-6)

Objectives:

- To introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- To acquire Familiarity with the basic protocols of computer networks and how they can be used to assist in network design and implementation.

UNIT-I

Introduction: Layered Networks Architecture, Review of ISO-OSI model, Data Communication techniques pulse code modulation (PCM) Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), transmission media wires cables, radio links, satellite links, fiber-optic links, error detection, parity check codes, cyclic redundancy codes, & Hamming code.

UNIT-II

Multiplexing and DLC Preliminaries:

Multiplexing techniques Frequency division, time division, statistical time division multiplexing, multiplexing hierarchies,

DLC Preliminaries: Stop and wait protocols: Noise free and noisy channels, performance and efficiency, sliding window protocols: Go back and selective repeat.

UNIT III

Data Link Protocols:

HDLC data link protocol, Integrated services digital networks; interfaces, Devices, Channel structure, Asynchronous transfer node (ATM) cells, header and cell formats, Layers in ATM, Class 1,2,3,4 traffic.

FDDI, Multiple access protocols: Concept of random access Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA,

UNIT-IV

Network Layer Protocols: Design Issues : Virtual Circuits and Datagram, Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address, subnetting, Routing : techniques, static vs. dynamic routing , routing table for classful address;Routing algorithms: Optimality principle, Shortest path routing – Dijkstra, bellman-ford and floyd warshall algorithms, flooding and broadcasting, distance vector routing, link state routing, flow based routing, multicasting, routing.

UNIT-V

Transport Layer Protocols and Congesting Control: General principles of congestion control, window flow control, packet discarding, Isarithmic control, traffic shaping, choke packets Leaky bucket algorithm, Token bucket algorithm, choke packets, Connection Management, Addressing, Connection Establishment and releases, flow control and buffering, multiplexing, crash recovery in TCP.

Presentation and Application Layer Protocols: Presentation concepts, Cryptography Substitution and transposition, ciphers, data encryption standard (DES), DES chaining, breaking DAS, public key cryptography, RSA , authentication protocols.

Books:

1. A.S. Tanenbaum, "Computer Networks", Second Ed., Prentice Hall India(tan).

2. J.F.Hayes, "Modeling and Analysis of Computer Communication Networks", Plenum press.

3.D.Bertsekas and R. Gallager, "Data Networks", Second Ed. Prentice Hall, India.

4. D.E. Comer, "Internetworking with TCP/IP", vol. 1, prentice Hall India.

5. G.E. Keiser, "Local Area Networks", McGraw Hill, international Ed.

6. W. Stalling, "Data & Computer Communications", Maxwell Macmillan international Ed.

Outcomes: Student would be able to

CO1: **Describe** various data communication techniques, OSI reference model, the TCP/IP reference model and other basics in data communication and networking (Understanding)

CO2: **Discuss** some medium access protocols (like, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD etc) ,some Modern topics (like ISDN services, ATM) (Understanding)

CO3: **Examine** various multiplexing techniques, error detection & correction methods, flow control methods and other concepts of computer networks to achieve required networking results as per standards. (Analyzing)

CO4: **Illustrate** different types of network devices and their functions within a network, Internetworking devices, Routing concepts, techniques and protocols and other concepts of computer networks (Applying)

CO5: **Evaluate** various congestion prevention, avoidance and control mechanisms and other concepts of computer networks (Evaluation)

CO6: **Justify** the use of cryptography, security and networking techniques and other concepts of computer networks for providing better network/applications in society (Evaluation)

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ELECTIVE-I (DE)
680214
Computer Architecture and Organization

Objectives:

1. To introduce basic concepts of computer organization.
2. To understand the architecture of modern computer.
3. To understand different instruction types.
4. To illustrate the computer organization concepts by Assembly Language programming.
5. To teach Assembly language programming.
6. To understand how a computer performs arithmetic operation of positive and negative numbers.
7. To understand how computer stores floating point numbers in IEEE 754 standard.
8. To understand how cache mapping occurs in computer.

UNIT-I

Representation of Information: Number, integer and floating-point representation, character codes (ASCII, EBCDIC), Error detection and correction codes. Basic Building Blocks: Boolean Algebra, combinational blocks: gates, multiplexers, decoders etc, Sequential building blocks: flip-flops,, registers, counters, ALU, Random access memory etc.

UNIT-II

Register Transfer Language and Micro-operations: concept of bus, data movement among registers, language to represent conditional data transfer, data movement from/to memory, arithmetic and logical operations along with register transfer, timing in register transfer.

UNIT-III

Architecture of a simple processor: A simple computer organization and instruction set, instruction formats, addressing modes, instruction execution in terms of microinstructions, concepts of interrupt and simple I/O organization, implementation of processor using the building blocks.

UNIT-IV

Assembly Language programming: detailed study of 8086/8088 assembly language instruction set, loops and comparisons, conditions and procedures, arithmetic operations in assembly language, illustrations using typical programs like: table search, subroutines, symbolic and numerical manipulations and I/O.

UNIT-V

Memory organization: basic cell of static and dynamic RAM, Building large memories using chips, associative memory, cache memory organization, virtual memory organization.

Books:

1. M. Morris Mano, "Computer System Architecture",PHI,3rd edition, 1993
2. Liu and Gibson, "8086/8088 Microprocessor Assembly Language".
3. Bartee, "Digital Computer Fundamentals".
4. Malvino, "Digital Computer Electronics".

Outcomes:

Student would be able to

CO1: **Analyze** computer hardware at abstract level.
CO2: **Design** the Instruction execution stages.
CO3: **Differentiate** between High level languages and machine language
CO4: **Depict** storage of positive and negative number at hardware level.
CO5: **Design** Assembly language programs.
CO6: **Solve** various problems related to secondary storage organization and utilization of cache memory

ELECTIVE-I (DE)
Web Technology
680216

Objectives:

1. understand best technologies for solving web client/server problems
2. analyze and design real time web applications
3. use Java script for dynamic effects and to validate form input entry
4. Analyze to Use appropriate client-side or Server-side applications

UNIT I

History of the internet, internetworking concepts, architecture, and protocol: Switch router etc., internet address and domains. Introduction World Wide Web (WWW), Hyper Text Transfer Protocol (HttP), feature of HTTP protocol HTTP request-response model, Hyper Text Transfer Protocol Secure (HTTPS).Security on the web, proxy server, Firewall.

UNIT II

Introduction to Hyper Text Markup Language (HTML), HTML elements, XHTML syntax and Semantics, extensible Markup Language (XML), element, attributes, entity declarations. DTD files and basics of Cascading Style Sheet (CSS),Document object Model (DOM) history and levels, Document tree.

UNIT III

Introduction to Java Script, Basic concepts, variables and data types, functions, conditional statements, Loops, Operators, Arrays. Introduction to Web Services: UDDI, SOAP, WSDL.

UNIT IV

PHP : Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP

UNIT V

PHP and MySQL : Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs

Text Books :

1. Web Technolgies, Uttam Roy, OXFORD University press
2. Web programming with HTML, XHTML and CSS, 2e, Jon Duckett, Wiley India
3. Web programming Bai, Michael Ekedahl, CENAGE Learning , India edition
4 An Introduction to Web Design + Programming, Paul S.Wang, India Edition

Course Outcomes:

Student would be able to

CO1: **Evaluate** web application architecture, technologies and frameworks
CO2: **Integrate** java and server side scripting languages to develop web applications
CO3: **Debug,** test and deploy web applications in different web servers
CO4: **Apply** the knowledge of web technology in developing web applications
CO5: **Implement** small to large scale project to provide live solution in web application development fields
CO6: **Evaluate** different solutions in field of web application development

ELECTIVE-I (DE)
Machine Learning with Python
680217

Objectives:

- To learn the basic construct of python programming for implementing various Machine Learning algorithms.
- To understand the basic concepts of Machine Learning.
- To use Machine Learning concepts and algorithms for real-world problem solving.

Unit – I Introduction to Python Programming: Setting up Programming Environment, Running Python Programs from a Terminal, Variables and Simple Data Types: Numeric, String, List, Tuple, Dictionary, Set, Boolean, Conditional Statements and Loops, Lambda Functions; Various inbuilt Functions; Read Write Operations in Files; using Python Packages and Modules.

Unit – II Data Processing and Visualization: Introduction to Pandas, Installation, Reading CSV Files and Performing Various Operations: Slicing, Merging, Concatenation on Various Datasets. Introduction to Numpy, Vector Representation, Basic Operations on N-Dimensional Matrices using Numpy. Data Visualization using Matplotlib, Plotting Various Types of Graphs: Line, Bar, Scatter, Histogram and Pie-Charts.

Unit – III Introduction to Machine Learning: Basic Principles, Applications, Challenges; Supervised, Unsupervised and Reinforcement Learning Approaches; Basic Steps of Machine Learning: Data Collection, Data Preparation, Choosing a Learning Model, Training a Model, Evaluation of Model, Parameter Tuning and Prediction.

Unit – IV Supervised Learning: Linear Regression, Gradient Descent, Features, Overfitting, Regularization and Complexity, Training, Validation, Testing Data, Performance Matrices: Mean Squared Error(MSE), Root-Mean-Squared-Error(RMSE), MeanAbsolute-Error(MAE), R^2 or Coefficient of Determination; Multivariate Regression; Applications of Regression. Classification: Binary, Multi-Class and Multi-Label Classification; Applications; Logistic Regression, K-Nearest Neighbour, Decision Trees, Random Forests, Support Vector Machines and Neural Networks; Comparison Matrix.

Unit – V Unsupervised Learning: Clustering and Association Problems, Applications; KMeans, DBSCAN, Principal Component Analysis, Apriori Algorithm for Association Rule Learning Problems. Machine Learning Model Building on Various Datasets available on Kaggle and UCI Repositories using Python Machine Learning Library: Scikit-Learn.

Books:

- John Hunt, A Beginners Guide to Python 3 Programming, Springer, 1st Edition, 2019.
- Learn Python the Hard Way: 3rd Edition.
- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes.
- Andreas C. Müller, Sarah Guido, Introduction to Machine Learning with Python, O'Reilly Media, Inc, 2016.
- Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow,

O'Reilly Media, Inc, 2017.

Course Outcomes:

After completion of this course, the students would be able to:

CO1. define basic concepts of machine learning.

CO2. summarize various concepts of python programming, data processing and visualization.

CO3. apply machine learning algorithms to solve real world problems using python programming.

CO4. compare machine learning algorithms for applicability and performance analysis.

CO5. assess various open source datasets and estimate the most suitable machine learning model for prediction process.

CO6. build machine learning models on open source datasets using python machine learning library. ----------

Elective-II (DE)
Managerial Economics
680218

UNIT-I

Meaning, nature and scope of managerial economics, difference and similarities between micro-economics and macro-economics, objectives of firm, Profit maximization theory alternative theories and behavioral theories of the firm

UNIT-II

Economic Principles, concepts of opportunity cost , marginal cost, incremental, time perspective, principles of discounting and equi-margin,

UNIT-III

Consumer behaviour-demand analysis purpose and concepts of demand, docrine of diminishing utility, elasticity of demand, price elasticity, income elasticity and cross elasticity, demand forecasting

UNIT-IV

Product and cost analysis short run and long run average cost curves Law of supply, economies and diseconomies of scale, law of variable proportions Production functions single output isoquants

UNIT-V

Pricing prescriptive approach, price determination under perfect competition, monopoly, oligopoly and monopolistic competition, methods of pricing, pricing strategies Profits nature and measurement policy, break even analysis, case study

Books

1. Dean J. Managerial Economics PHI, New Delhi
2. Mote V.L. et al Management Economics Concepts and Cases TMH, New Delhi

Course outcomes: Student would be able to

CO1 Develop an understanding of management and its uses in day to day life
CO2 The aware students about each and functions of management and to understand the ability to understand how management serves as a guideline to sustain in professional life
CO3 Develop an understanding of professional and ethical responsibilities so as to analyze and solve contemporary issue
CO4 Relate the subjects of arts and management in engineering and allied fields
CO5 Understanding as to how management helps a student to understand, adjust and adapt to the world around us
CO6 Enhance the understanding of economics and its impact on organization

Elective-II (DE)
Corporate Planning
680219

Unit 1: Introduction to Strategies: Introduction, Fundamentals of Strategy, Conceptual Evolution of Strategy, Scope and Importance of Strategies, Purpose of Business, Difference between Goals and Objectives of Business, Strategic Intent through Vision and Mission Statements, Core Competencies of Business
Strategic Management: Introduction, Strategic Management, Need, scope, key features and importance of strategic management, Role of Strategists in Decision Making, strategists at various management levels, Types of Strategies, Limitations of Strategic Management

Unit 2: Strategy Analysis: Introduction, Strategy Analysis and its Importance, Environmental Appraisal and Scanning Techniques, Organisational Position and Strategic Advantage Profile, Strategic Management Model
Strategy Formulation and Implementation: Introduction, Strategy Formulation, Process in Strategy Formulation, Strategy Implementation and its Stages, Reasons for Strategy Failure and Methods to Overcome, Strategy Leadership and Strategy Implementation, Strategic Business Units (SBUs)

Unit 3: Strategic Control and Evaluation: Introduction, Strategy Evaluation, Strategic Control, Difference Between Strategic Control and Operational Control, Concept of Synergy and its Meaning, Key Stakeholder's Expectations
Business Policies: Introduction, Overview of Business Policies, Importance of Business Policies, Definitions of Policy, Procedures, Process and Programmes, Types of Policies, Business Policy Statements, Corporate Culture

Unit 4: Strategies for Multinational Corporations: Introduction, Multinational Corporations (MNCs), Benefits of MNCs, Limitations of MNCs, Business Strategies of MNCs, Techniques Employed by MNCs to Manage Markets, MNC, TNC and Global Companies
Strategic Alliances: Introduction, Strategic Alliances, Types of Strategic Alliances and Business Decisions, Problems Involved in Strategic Alliances

Unit 5: Role of Creativity and Innovation in Business: Introduction, Creativity, Innovation, Creating and Building Creative and Innovative Business Culture, Business Practices Adopted to Promote Creativity and Innovation, Importance of Creativity and Innovation in Business, Challenges Involved in Creativity and Innovation
Business Ethics and Corporate Social Responsibility : Introduction, Ethics and Values, Ethical Conduct and Unethical Conduct, Impact of Ethical Conduct, Corporate Social Responsibilities (CSR), Business obligations, Social Audit and Corporate Governance

Books:

1. Business Policy - Azhar Kazmi- S. Chand & Co. New Delhi
2. Strategic Management: Concepts & Cases - Upendra Kachru, Excel Bppks
3. Strategic Planning: Formulation of Corporate strategy - V S. Ramaswamy, S Namakumari - Macmillan Publishing House Ltd.
4. Management Policy & Strategic Management - R. M. Shivastava, Himalaya Publishing House, Mumbai.

5. Creating Excellence - Craig R. Hickman & Michael A. Silva - London Univeral Book Stall, New Delhi.

Course Outcomes:

CO1. Describe major theories, background work, concepts and research output in the field of strategic management.
CO2. Demonstrate a clear understanding of the concepts, tools & techniques used by executives in developing and executing strategies and will appreciate its integrative and interdisciplinary nature.
CO3. Demonstrate effective application of concepts, tools & techniques to practical situations for diagnosing and solving organisational problems.
CO4. Demonstrate capability of making their own decisions in a dynamic business landscape.
CO5. Develop their capacity to think and execute strategically.
CO6. Select and apply current technologies to support an organization's integrative trade initiatives.

Elective-II (DE)
Computer Graphics and Multimedia
680215

Objectives:

- To identify and explain the core concepts of computer graphics.
- To apply graphics programming techniques to design, and create computer graphics scenes.
- To understand the basics of multimedia data, video data and audio data

UNIT-I

Introduction: Basics of computer graphics, Graphics hardware and software, DDA and Bresenhan's line drawing algorithm, antialiasion, circle generation Midpoint algorithms, ellipse, other curves, character generation, area filling scan line algorithm, boundary fill flood fill algorithm, attributes of output primitives line attributes, area fill attributes, character attributes.

UNIT-II

Two-dimensional Transformations: Translation scaling rotation reflection sheer, matrix representation and homogeneous coordinate's composite transformation commands. Viewing coordinates window, view port, clipping, window to view transformation line clipping Cohan Sutherland algorithm polygon clipping Sutherland-hodgeman algorithm.

Unit-III

Three-dimensional concepts: Three dimensional viewing, three dimensional object presentation : polygons, cured line & surfaces quadrate (sphere, ellipsoid), surfaces, design of curves & surfaces, bezier's methods, Bspling methods; three dimensional transformation: Translation, scaling composite transformation, rotation, about arbitrary axis, projection: parallel, perspective.

UNIT-IV

Introduction to multimedia Introduction to multimedia, multimedia and hypermedia, Multimedia hardware, analog media devices, digital media devices, MIDI, RAID, CD-ROM standards, Multimedia software: Multimedia operating systems, multimedia databases, multimedia software tools.

UNIT-V

Video Data: Video representation and operations on video data type, YUV, YIQ and YCbCr Color models, analog to digital video conversion, Basic video compression schemes, H.261 Video, H.263, MPEG-1 and MPEG-2 Video compression standards.

Sound and Audio: Digitization of sound, Signal-to-Noise Ration(SNR), Linear and non linear quantization, audio filtering MIDI Hardware aspects, structure of MIDI, MIDI to wav conversion, Quantization and transformation of audio Pulse code modulation, differential coding, DPCM, DM and ADPCM, audio formats.

Books:

1. D.Hearn and M.P. Baker Computer Graphics (2nd ed), PHI
2. S.Harrington–Computer Graphics–a Programming approach (2nd ed) McGrawhill.
3. New Mann & Sprout – Principles of interactive computer graphics (2nd ed) McGrawhill.

4. Multimedia Computing, communications and applications: Ralf Steinmetz and Klara Nahrstedt, Pearson Education.
5. Multimedia Systems Design: Prabhat K. Andleigh and Kiran Thakrar, PHI.
6. Multimedia Systems: John F.K. Buford, Pearson Education.

Course Outcomes:

Student would be able to

CO1: **Analyze** the structure of an interactive computer graphics system.
CO2: **Apply** geometrical transformations, interaction techniques and 2D viewing.
CO3: **Demonstrate** use of modern 3D computer graphics techniques, models, and algorithms to solve graphics problems.
CO4: **Incorporate** and operate various multimedia object and technology.
CO5: **Analyze** various compression schemes.
CO6: **Analyze** various audio formats.

Elective-II (DE)
Unix and Shell Programming
680223

UNIT-I

General Overview of the System: System structure, user perspective/S services assumption about Hardware, The Kernel and buffer cache architecture of UNIX O/S, System concept Kernel data structure, System administration, Buffer headers, Structure of the buffer pool, scenarios for retrieval of the buffer, Reading and Writing disk block, Advantage and disadvantage of buffer cache.

UNIT-II

Internal Representation of Files: INODES, Structure of regular, Directories conversation of a path name to an inode, SuperBlock, node assignment to a new file, Allocation of Disk blocks.

UNIT-III

System Calls for the System: Open read write file and record close, File creation Operation of Special files change directory and change root, change owner and change mode, STAT and FSTAT, PIPES mounting and unmounting files system, Link & Unlink.

UNIT-IV

Structure of Process and Process Control: Process states and transaction layout of the system memory, the context of the process, and manipulation of process address space, Sleep Process creation/termination. The user Id of a process, changing the size of the process, The SHELL.

UNIT-V

Interprocess Communication and multiprocessor system: Process tracing system V IPO network communication sockets problem of multiprocessor systems, solution with master and hare process, solution with semaphores.

Introduction to shell scripts: Bourn shell, C shell, shell variables, scripts, metacharacters and environment, if and case statements, for while and until loops.

Linux History & Features of Linux,Linux structure, various flavours of linux.

Books:

1. Design of UNIX O.S. by M.J. Bach,Prentice Hall of India.
2. B.W. Kernighan & R. Pike, The UNIX Programming Enviornment,Prentice Hall of India,1995.
3. S. Prata Advanced LINUX A Programming Guide,BPB Publication, New Delhi
Guide to UNIX using LINUX by Jack Dent Tony Gaddis,Vikas.Thomsaon Pub,
4. House Pvt. Ltd.
Linux complete by BPB Publications. Linux Kernel by Beck Pearson Education, Asia.

Course outcomes:

Student would be able to

CO1: Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System

CO2: Effectively use software development tools including libraries, preprocessors, compliers, linkers

and make files.

CO3: Demonstrate UNIX commands for file handling and process control.

CO4: Identify and use Unix utilities to create and manage simple file processing operations, organize directory structures with appropriate security and develop shell scripts to perform more complex tasks.

CO5: Differentiate memory management techniques used in operating systems and how cache memory should work.

CO6: Develop programs with the help of shell script etc.

Lab-III
Java Programming Lab
680223
(DLC3)

Basics: Data types; Operators- precedence and associativity, Type conversion, The decision making – if, if .else, switch; loops – for, while, do .while, special statements- return, break, continue, labeled break, labeled continue; Modular programming methods, arrays; memory allocation and garbage collection in java keywords

Class; Packages; scope and lifetime; Access specifies; Constructors, Copy constructor, this reference; finalize () method; arrays; Memory allocation and garbage collection in java keywords; variable argument list; command line arguments, super keyword.

Basic idea of multithreaded programming; The lifecycle of a thread, Creating thread with the thread class and runnable interface; Thread synchronization, Thread scheduling; Producer-consumer relationship; Daemon thread, Selfish threads, Basic idea of exception handling; The try, catch and throw; throws Constructor and finalizers in exception handling; Exception Handling.

Applet security restrictions; the class hierarchy for applets; Life cycle of applet, HTML Tags for applet.

Course outcomes:

Student would be able to

CO1: **Apply** the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.

CO2: **Implement, compile, test and run** Java programs comprising more than one class, to address a particular software problem.

CO3: **Demonstrate** the ability to use simple data structures like arrays in a Java program.

CO4: **Make** use of members of classes found in the Java API (such as the Math class).

CO5: **Demonstrate** the ability to employ various types of selection constructs in a Java program.

CO6: **Employ** a hierarchy of Java classes to provide a solution to a given set of requirements.

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Lab-IV
Business Programming Laboratory
680224
(DLC-4)

This course is an introduction to basic concepts of business modelling and underlying technologies for implementing the business practices. In this emphasis is on developing business and commercial applications in stand- alone mode or as android based applications. Student may be exposed the process of app development for business applications. Emphasis is placed on the implementation of programs with procedural structures, along with graphical user interfaces and event-driven code. Upon completion, students should be able to design, code, test, and debug programs based on business requirements using a selected programming language.

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