GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)

An Autonomous Institute (UGC)
Approved by AICTE, New Delhi and Affiliated to MDU, Rohtak
NAAC 'A' GRADE

Scheme of Studies and Examination
Master of Computer Science and Applications

DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	1 Tutorial (T) per week	1 Credit
3	1 Practical (P) per week	0.5 Credit
4	2 Practical (Lab) per week	1 Credit

1. RANGE OF CREDIT

A range of credits from 110-120 for a student will be eligible to get Post Graduate degree.

2. STRUCTURE OF MASTER OF COMPUTER APPLICATIONS PROGRAM (MCA)

Sr. No.	Category	Breakup of Credits MCA
1	Discipline-Specific Courses (DSC) /Experiential Learning	72*
2	Discipline-Specific Elective Courses	32*
3	Multidisciplinary Open Elective Courses	03*
4	Foundation Elective Courses	03*
4	Research Project/Dissertation	06*
	Total Credits	**116***

Minor variation is allowed as per need of the respective disciplines.

3. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Discipline Specific Courses	DSC
2	Discipline Specific Elective Courses	DSEC
3	Experiential Learning	EL
4	Research Report	RR
5	Multidisciplinary Open Elective Courses	MDC
6	Bridge Course	BC

4. ELIGIBILITY FOR ADMISSION TO MCA 2-YEAR PROGRAMME

a) Passed BCA/B.Sc. (Hons.) Computer Science/ B.E. or B.Tech. (CSE/IT)/ B.Voc. (Software Development/IT) or an equivalent degree with having at least 50% marks (45% for SC/ST candidates of Haryana only) in aggregate.

Or

b) Passed B.Sc. / B. Com/ B.A with Mathematics at 10+2 level or at Graduation level with having at least 50% marks (45% for SC/ST candidates of Haryana only) in aggregate, along with the students admitted with this eligibility will have to simultaneously undertake additional

c) Bridge Course* as prescribed by the institute during the first semester.

Note: It is compulsory for each student to pass out Bridge Course (three additional theory papers and one practical as prescribed in scheme of examination of Bridge Course) as per institute norms during the 1st year of MCA-2 year course and the degree will be awarded after the completion of Bridge Course. However, these papers under Bridge Course will be taught only in the 1st semester of the course.

Note:

1. The duration of all the end-term theory examinations shall be 3 hours.
2. The Criteria for Assessment of Theory Courses throughout the Program shall be as under:

i. End Semester Examination (Theory Examination):

Questions papers for the end semester examination shall be set by paper setters appointed by Controller of Examinations in consultation with Chairperson of the Examination Committee i.e. Director of the Institute from a panel of examiners submitted by the Chairman of the Board of Studies. In case a question paper is not received in time from a paper setter COE shall get the paper set from an alternate examiner who is otherwise competent to do so from the panel approved by BOS. The evaluation of answer scripts shall be done as per procedure laid down by the Examination Committee.

ii. Practical Examination:

Examination in Practical and viva-voce shall be conducted jointly by the two examiners. One examiner shall be appointed by the Controller of Examinations from a panel of examiners submitted by Chairman of B.O.S. of respective departments and one examiner by Head of the department.

iii. Sessional (Internal Assessment):

Sessional works shall be evaluated by the teachers of the various subjects/courses based on the work done during semester on the basis of the following weightage:

I. For Theory subjects:

I. Sessional Test –I 60% of the weightage of the Internal Marks
   Sessional Test-II considering best two of three sessional tests
   Sessional Test-III
II. Assignments / Classwork 20% of the weightage of the Internal Marks
III. Attendance 20% of the weightage of the Internal Marks

The marks for attendance will be awarded as per below mentioned criteria

S. No	Range	%age (Weightage)	Out of 8	Out of 5	Out of 3
1	Above 90%	100	8	5	3
2	85-89.99%	80	6	4	3
3	80-84.99%	60	5	3	2
4	75-79.99%	40	4	2	2
5	65-75%	20	2	1	1
6	Less than 65	0	0	0	0

II. For Practical/Project/Seminar/Drawing:

i. Viva-Voce/ Test 20% of the weightage of the practical
ii. Laboratory Record/ 48% of the weightage of the practical
   a. Project Report/Seminar
   b. Report/Drawing Sheet
iii. Attendance 32% of the weightage of the practical

Every student has to appear in minimum two Sessional Tests. If a student does not take a Sessional test, he/she shall be awarded zero marks in that test. The marks obtained in sessional/practical/theory/drawing are to be submitted to the Examination Branch duly signed by the Head of the department before the close of semester examination or marks can be uploaded on the examination portal before a date fixed by the COE. The examination branch shall convert the marks in to equivalent grades as per the grading procedure.

The proportion of external and internal assessment in any course shall be preferably 60%:40%. However, this proportion may vary depending upon the nature of course.

Scheme of Studies and Examination
MCA – 3rd Semester
w.e.f. 2025-26

SN	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in Hours
				L	T	P			Assessment	End Semester Exam		Total	
										Theory	Practical		
1	Discipline-Specific Courses	DSC-MCA-201A	Data Mining & Big Data Analytics	4	0	0	4	4	40	60		100	3
2	Discipline-Specific Courses	DSC-MCA-203A	Machine Learning & Python Programming	4	0	0	4	4	40	60		100	3
3	Discipline-Specific Courses	DSC-MCA-205A	Network Programming	4	0	0	4	4	40	60		100	3
4	Discipline Specific Elective Courses	Refer Table-II (a)	Elective-V	4	0	0	4	4	40	60		100	3
5	Discipline Specific Elective Courses	Refer Table-II (b)	Elective-VI	4	0	0	4	4	40	60		100	3
6	Experiential Learning	EL-MCA-207A	Software Lab-5	0	0	6	6	3	50		50	100	3
7	Experiential Learning	EL-MCA-209A	Software Lab-6	0	0	6	6	3	50		50	100	3
8	Open Elective (O)	Refer Table-IV	To be Chosen from the pool of Open Electives provided by the Institute					3					
Total								**29**	300	300	100	**700**	

Scheme of Studies and Examination

MCA – 4th Semester

w.e.f. 2025-26

SN	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in Hours
				L	T	P			Assessment	End Semester Exam		Total	
										Theory	Practical		
1	Discipline-Specific Courses	DSC-MCA-202A	Advance Software Engineering	4	0	0	4	4	40	60		100	3
2	Discipline-Specific Courses	DSC-MCA-204A	IoT & Sensor Networks	4	0	0	4	4	40	60		100	3
3	Discipline-Specific Courses	DSC-MCA-206A	Web Development Using.NET Framework	4	0	0	4	4	40	60		100	3
4	Discipline Specific Elective Courses	Refer Table-II (c)	Elective-VII	4	0	0	4	4	40	60		100	3
5	Discipline Specific Elective Courses	Refer Table-II (d)	Elective-VIII	4	0	0	4	4	40	60		100	3
6	Experiential Learning	EL-MCA-208A	Software Lab-7	0	0	6	6	3	50		50	100	3
7	Experiential Learning	EL-MCA-210A	Software Lab-8	0	0	6	6	3	50		50	100	3
8	Research Report	RR-MCA-212A	Industry Internship Report/ Project Report/Dissertation–II	0	0	0	6	3	50		50	100	3
							Total	**29**	340	300	160	**800**	

Table No. II (a) (Discipline Specific Elective Courses)

Elective- V

Sr. No.	Course Code	Course Title
1	DSEC-MCA-211A	Cyber Security & Blockchain Technology
2	DSEC-MCA-213A	Software Testing & Quality Assurance

Table No. II (b) (Discipline Specific Elective Courses)
Elective- VI

Sr. No.	Course Code	Course Title
1	DSEC-MCA-215A	Android Mobile Application Development
2	DSEC-MCA-217A	Full Stack Development

Table No. II (c) (Discipline Specific Elective Courses)
Elective- VII

Sr. No.	Course Code	Course Title
1	DSEC-MCA-214A	Artificial Intelligence
2	DSEC-MCA-216A	Mixed Reality & Wearable Computing

Table No. II (d) (Discipline Specific Elective Courses)
Elective-VIII

Sr. No.	Course Code	Course Title
1	DSEC-MCA-218A	High Speed Networks
2	DSEC-MCA-220A	Neural Networks & Deep Learning

Table-IV (Pool of Foundation Elective Course defined by the Institute)
Foundation Elective Courses

SN	Course Code	Course Name	Offered by Department
1	OEC-131A	Fundamental of Income Tax	Management Department
2	OEC-133A	Stress Management	Management Department
3	OEC-135A	Fundamental of Marketing	Management Department
4	OEC-137A	Business Analytics	Management Department
5	OEC-139-A	Statistical Tools using SPSS	Applied Sc. & Humanities (Mathematics)
6	OEC-141-A	Mathematical Techniques and Applications	Applied Sc. & Humanities (Mathematics)
7	OEC-143A	MATLAB	Electrical Engineering
8	OEC-145A	Sources of Energy-II	Electrical Engineering
9	OEC-147A	Natural and Manmade Disaster	Civil Engineering
10	OEC-149A	Software Engineering Practices	Computer Sc. & Engineering
11	OEC-151A	Composite Materials	Mechanical Engineering
12	OEC-153A	Cost Management of Engineering Projects	Mechanical Engineering
13	OEC-155A	Voice and Data Network	Electronics and Communication Engineering
14	OEC-157A	IT for Professionals	Computer Sc. & Applications

Course Code	**DSC-MCA-201A**				
Category	Discipline Specific Courses				
Course Title	**Data Mining and Big Data Analytics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand fundamental concepts of data mining and knowledge discovery. • Explore data mining techniques like frequent pattern mining, classification, and clustering. • Gain practical experience using WEKA for real dataset mining. • Learn Big Data architecture and tools like Hadoop, MapReduce, Pig, Hive, and apply analytics using R and Big R.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall data mining basics, classification/clustering methods, Hadoop architecture, and MapReduce tools.	Level 1: Remember
CO2	Explain data mining steps, classification/clustering techniques, Hadoop components, and tools like Pig, Hive, and HBase.	Level 2: Understand
CO3	Apply data preprocessing, classification, clustering in WEKA, and process big data using Hadoop and its tools.	Level 3: Apply
CO4	Analyze data patterns, evaluate mining results, and assess performance of Hadoop-based analytics frameworks.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Data Mining Concepts: Introduction to Data Mining Systems, Knowledge Discovery Process, Data Mining Techniques, Issues, Applications, Data Objects and Attribute types, Statistical description of data; Data Pre-processing – Cleaning, Integration, Reduction, Transformation and Discretization; Data Visualization, Data similarity and dissimilarity measures.

Frequent Pattern Analysis: Mining Frequent Patterns, Associations and Correlations; Mining Methods- Pattern Evaluation Method, Pattern Mining in Multilevel; Multi-Dimensional Space – Constraint Based Frequent Pattern Mining; Classification using Frequent Patterns.

Unit-II

Classification and Clustering: Decision Tree Induction, Bayesian Classification, Rule Based Classification, Classification by Back Propagation, Support Vector Machines, Lazy Learners, Model Evaluation and Selection, Techniques to improve Classification Accuracy. Clustering Techniques: Cluster analysis, Partitioning Methods - Hierarchical Methods, Density Based Methods, Grid Based Methods; Evaluation of clustering, Clustering high dimensional data, Clustering with constraints, Outlier analysis-outlier detection methods.

WEKA Tool: Introduction to Datasets, WEKA sample Datasets, Data Mining Using WEKA tool.

Unit-III

Overview of Big Data and Hadoop: Types of Digital Data, Overview of Big Data, Challenges of Big Data,Modern Data Analytic Tools, Big Data Analytics and Applications;Overview and History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Environment.

HDFS: Concepts of Hadoop Data File System, Design of HDFS, Command Line Interface, Hadoop file system interfaces, Data flow; Hadoop I/O: Compression and Serialization.

Unit-IV

Map Reduce: Introduction, Map Reduce Features, How Map Reduce Works, Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats.

Hadoop Eco System: Pig - Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases. Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase: HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL: Introduction.

Data Analytics with R: Introduction of R and Big R, Collaborative Filtering, Big Data Analytics with Big R.

Suggested Readings:

- Jiawei Han & Micheline Kamber: Data Mining - Concepts & Techniques, Harcourt India PVT Ltd. (Morgan Kaufmann Publishers).
- I.H. Whiffen: Data Mining, Practical Machine Learning tools & techniques with Java (Morgan Kanffmen)
- A.K. Pujari: Data Mining Techniques, University Press.
- Pieter Adriaans Dolf Zant inge: Data Mining, Addition Wesley.
- David Hand, Heikki Mannila, and Padhraic Smyth: Principles of Data Mining, PHI Publication.
- Michael Berthold, David J. Hand: Intelligent Data Analysis, Springer.
- Tom White: Hadoop- The Definitive Guide, Third Edition, O'reilly Media.
- Seema Acharya, Subhasini Chellappan: Big Data Analytics, Wiley.
- Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos: Understanding BigData: Analytics for Enterprise Class Hadoop and Streaming Data, Mc Graw Hill publishing.
- Anand Rajaraman and Jeffrey David Ullman: Mining of Massive Datasets, Cambridge University Press.
- Bill Franks: Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streamswith Advanced Analytics, John Wiley &Sons.
- Glenn J. Myatt: Making Sense of Data, John Wiley & Sons.
- Pete Warden: Big Data Glossary, O'Reilly.
- Zikopoulos, Paul, Chris Eaton: Understanding Big Data- Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Data Mining Systems	https://youtu.be/m5c27rQtD2E?si=j9lfWHPW0RkokaTP
	Knowledge Discovery Process, Data Mining Techniques,	https://youtu.be/ykZ-_UGcYWg?si=15AkhCFzN7AN5yvS
Unit-II	Decision Tree Induction, Bayesian Classification	https://youtu.be/NSxEiohAH5o?si=rfY7KUnGXhoN5DoI
	Data Preprocessing – II	https://youtu.be/wZQM_9vhulg?si=LSUr17zIn67NzJZW
	WEKA sample Datasets, Data Mining Using WEKA tool.	https://youtu.be/qKueRV2yq_E?si=Apq8hUAzgNstLJ_K
Unit-III	Types of Digital Data, Overview of Big Data	https://youtu.be/La-NZ6jOfoQ?si=m1iiH_9rS_Si44oO
	Apache Hadoop, Analysing Data with Unix tools	https://youtu.be/r5k-_RLIpuA?si=UNcaPp8uVI90lO1T
Unit-IV	Hadoop Eco System: Pig - Introduction to PIG, Execution Modes of Pig	https://youtu.be/YAzzGal41hA?si=9mQkCaZBcUMEomIL
	Introduction of R and Big R	https://youtu.be/3iSKFCKLUsI?si=OVzksmHyIA8Sp8yO

Course Code	**DSC-MCA-203A**				
Category	Discipline Specific Courses				
Course Title	**Machine Learning and Python**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand machine learning fundamentals and apply supervised learning algorithms like decision trees and regression models. • Explore ensemble, unsupervised learning methods, and reinforcement learning techniques like Q-learning and policy iteration. • Develop Python programming skills for machine learning, focusing on data types, control structures, and NumPy operations. • Apply Python for data visualization, file handling, database operations, and machine learning tasks like regression and data distribution.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall core machine learning paradigms, Python syntax, NumPy functions, and data visualization concepts in 2D and 3D contexts.	Level 1: Remember
CO2	Describe supervised, unsupervised, and reinforcement learning methods, ensemble techniques, and Python modules for data analysis and manipulation.	Level 2: Understand
CO3	Implement machine learning models, perform clustering and dimensionality reduction, and visualize datasets using Python libraries like Matplotlib and Mayavi.	Level 3: Apply
CO4	Analyze learning algorithms, interpret regression results, and examine statistical patterns using data distributions, deviation, and scatter plots.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Machine Learning: Introduction, various learning paradigms, perspective and issues, Version spaces, finite and infinite hypothesis spaces, PAC learning, learning versus Designing, Training versus Testing, Predictive and descriptive tasks.

Supervised Learning: Decision trees- ID3, classification and regression trees; Regression- linear regression, Multiple linear regression, logistic Regression; Support Vector Machines- linear and non-linear, kernel functions, K-nearest neighbors.

Unit-II

Ensemble Learning: Model combination Schemes, Voting, Error-correcting output codes; Bagging: Random Forest Trees; Boosting: Adaboost, Stacking.

Unsupervised Learning: Introduction to Clustering, Hierarchical: AGNES, DIANA; Partitional: K-means clustering, K-mode clustering, Expectation Maximization, Dimensionality Reduction, Feature Selection, PCA, factor analysis, manifold learning.

Reinforcement Learning: Value iteration; policy iteration; TD learning; Q learning; actor critic

Unit-III

Introduction to Python: History and Origin of Python Language, Features, Python, two modes of using Python interpreter, variable and data types, operator and their precedence, Python string & slicing, Python lists, mutable and immutable types, Input from keyboard. Loops and Iterations, Functions, Strings & Lists.

Modules and Packages: Python Modules and Packages, Different ways to import Packages, File Input/Output,The pickle module, Formatted Printing, Exception Handling.

Arrays and Matrices: The NumPy Module, Creating Arrays and Matrices, Copying, Arithmetic Operations, Cross product & Dot product, Saving and Restoring, Matrix inversion, Vectorized Functions.

Unit-IV

2D & 3D Data Visualization: The Matplotlib Module, Multiple plots, Polar plots, Pie Charts, Plotting mathematical functions, Sine function and friends, Parametric plots, Astroid, Ellipse, Spirals of Archimedes and Fermat, Polar Rose, Power Series & Fourier Series, 2D plot using colors, Fractals, Meshgrids, 3D Plots, Surface Plots & Line Plots, Wire-frame Plots, Mayavi, 3D visualization; Files and Streams:File modes and permissions, Reading & Writing data from a file, Redirecting output streams to files, Working with directories, CSV files and Data Files.

Python and Databases: ODBC and Python, Working with database in MySQL.

Machine Learning: Getting started, Mean, median, Mode, Deviation, percentile, Data distribution, Scatter plot, Regression

Suggested Readings:

- Ethem Alpaydin: Introduction to Machine Learning, MIT Press, PHI, 3rd Edition 2014.
- M. Gopal: Applied Machine Learning, TMH.
- Tom Mitchell: Machine Learning, McGraw Hill.
- Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar: Foundations of Machine Learning, MIT Press, 2012.
- Vinod Chandra and Anand Harindra: Artificial Intelligence and Machine Learning, PHI.
- E. Alpaydin: Introduction to Machine Learning, Prentice Hall of India.
- Ethem Alpaydin: Introduction to Machine Learning, PHI learning.
- Pooja Sharma: Programming in Python", BPB Publications, 2017.
- R. Nageswara Rao: Core Python Programming, Dreamtech.
- Langley: Elements of Machine Learning, Morgan Kaufmann.
- Hans Fangohr: Introduction to Python for Computational Science and Engineering(A beginner's guide).
- Timothy A. Budd: Exploring Python, McGraw Hill Education
- Mark Lutz: Learning Python 4th Edition, O'Reilly Publication

- Jason Bell: Machine Learning: Hands-On for developers and Technical Professionals Wiley Publication, 2015.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Machine Learning	https://www.youtube.com/watch?v=r4sgKrRL2Ys&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77
	Supervised Learning	https://www.youtube.com/watch?v=OTAR0kT1swg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=3
Unit-II	Unsupervised Learning	https://www.youtube.com/watch?v=NhimXdFenrg
	Reinforcement Learning	https://www.youtube.com/watch?v=ewkm38skUlY&list=PLEAYkSg4uSQ0Hkv_1LHlJtC_wqwVu6RQX
Unit-III	Introduction to Python	https://www.youtube.com/watch?v=eoPsX7MKfe8&list=PLIdgECt554OVFKXRpo_kuI0XpUQKk0ycO
Unit-IV	2D & 3D Data Visualization	https://www.youtube.com/watch?v=eFByJkA3ti4

Course Code	**DSC-MCA-205A**				
Category	Discipline Specific Courses				
Course Title	**Network Programming**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand UNIX OS fundamentals and networking protocols like TCP/IP, IPv4, IPv6, UUCP, and XNS. • Implement network communication using Berkeley, Windows, and Java sockets with multithreaded client-server models. • Explore web technologies and security concepts like RMI, JavaScript, WAP, CORBA, cryptography, and firewalls. • Build and deploy networked applications using client-server programming, HTTP servers, URL handling, and multithreading.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall UNIX concepts, socket APIs, JavaScript, CORBA, and client-server programming steps.	Level 1: Remember
CO2	Explain UNIX sockets, Windows I/O models, WAP, RMI, and client-server communication flow.	Level 2: Understand
CO3	Apply sockets, Winsock APIs, multithreading, Java/CORBA for web apps, and URL content retrieval.	Level 3: Apply
CO4	Analyze UNIX communication, compare APIs and models, evaluate web security, and assess server performance.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Overview of UNIX OS, Environment of a UNIX process, Process control,Process relationships Signals, Interprocess Communication, Overview of TCP/IP, Networkarchitecture, UUCP, XNS, IPX/SPX for LANs, TCP & IP headers, IPv4 & v6 address structures.

Socket Programming: Creating sockets, Posix data type, Socket addresses, Assigning address to a socket, Java socket programming, Thread programming, Berkeley Sockets: Overview, socket address structures, byte manipulation & address conversion functions, elementary socket system calls – socket, connect, bind, listen, accept, fork, exec, close, TCP ports (ephemeral, reserved), Berkeley Sockets: I/O asynchronous & multiplexing models, select & poll functions, signal &fcntl functions, socket implementation (client & serverprograms), UNIX domain protocols.

Unit-II

APIs & Winsock Programming: Windows socket API, window socket & blocking I/Omodel, blocking sockets, blocking functions, timeouts for blocking I/O, API overview, Different APIs & their programming technique, DLL & new API's, DLL issues, Java Beans.

Unit-III

Web Programming & Security: Java network programming, packages, RMI, Overview ofJavascript, WAP architecture & WAP services, Web databases, Component technology, CORBA concept, CORBA architecture, CGI programming, Firewall & security technique, Cryptography, Digital Signature.

Unit-IV

Client Server Programming: Client-side programming: Creating sockets, implementing generic network client, Parsing data using string Tokenizer, retrieving file from an HTTP server, retrieving web documents by using the URL class. Server-side programming: Steps for creating server, accepting connection from browsers, creating an HTTP server, Adding multithreading to an HTTP server.

Suggested Readings:

- W.Richard Stevens: Advanced Programming in the UNIX Environment, AddisonWesley.
- W. Stevens, Bill Fenner, Andrew Rudoff: UNIX Network Programming -Volume 1 (The Sockets Networking API), Pearson Education/Prentice-Hall International.
- Meeta Gandhi,Tilak Shetty and Rajiv Shah: The 'C' Odyssey Unix –The openBoundless C, BPB Publications.
- Steven.W.R: UNIX Network Programming (Volume I& II), PHI.
- Bobb Quinn and Dave Schutes: Window Socket Programming byDavis.R.: Windows Network Programming, Addison Wesley.
- Baner.P.: Network Programming with Windows Socket, Prentice Hall

Useful Video links:

Unit No.	Topics	Links
Unit-I	Overview of UNIX OS, Environment of a UNIX process	https://youtu.be/jciGIvn7UfM?si=9L5lcL629bnWHngD
	Socket Programming	https://youtu.be/JExfKvUgrtI?si=iKBrou1Vvou9PAYa
Unit-II	APIs & Winsock Programming	https://youtu.be/JExfKvUgrtI?si=DL1vk8AtNQlpOBHu
Unit-III	Web Programming & Security	https://youtu.be/HIQsZGx52QY?si=OT9sTb-eRAK2U86H
Unit-IV	Client Server Programming	https://youtu.be/XlryaovT_3k?si=t4ub0AwC62DSe77n

Course Code	**EL-MCA-207A**				
Category	Experiential Learning				
Course Title	**Software Lab-5**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • Develop problem-solving skills using Python for algorithms like GCD, power, and square root calculations. • Implement and analyze fundamental search algorithms including linear and binary search techniques. • Design and apply sorting algorithms such as selection, insertion, and merge sort efficiently. • Create Python programs to generate prime numbers and manipulate lists for algorithmic practice.				
Internal Assessment	50 Marks				
External Practical	50 Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Implement algorithms in Python for computing GCD, square roots, powers, searching, sorting, and prime number generation.	Level 3: Apply
CO2	Analyze algorithm efficiency and correctness for searching, sorting, and numerical methods within computational problem contexts.	Level 4: Analyze
CO3	Evaluate different algorithmic approaches and their performance trade-offs in solving computational problems effectively.	Level 5: Evaluate
CO4	Design and develop efficient Python programs to solve real-world computational problems using appropriate algorithms and data structures.	Level 6: Create

List of Experiments

Sr. No.	Contents
1	Write a Program in Python to Compute the GCD of two numbers.
2	Write a Program in Python to find the square root of a number by using Newton's Method.
3	Write a Program in Python to find the Power of a Number.
4	Write a Program in Python to find the Maximum of a list of Numbers.
5	Write a Program in Python to Implement Linear Search.
6	Write a Program in Python to Implement Binary Search.
7	Write a Program in Python to Implement Selection Sort.
8	Write a Program in Python to Implement Insertion Sort.
9	Write a Program in Python to Implement Merge Sort.
10	Write a Program in Python to find first n Prime Numbers.
11	Write a program to Compare bubble vs merge sort on same dataset
12	Write a program to Compare selection vs insertion sort on same dataset

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Machine Learning	https://www.youtube.com/watch?v=r4sgKrRL2Ys&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77
	Supervised Learning	https://www.youtube.com/watch?v=OTAR0kT1swg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=3
Unit-II	Unsupervised Learning	https://www.youtube.com/watch?v=NhimXdFenrg
	Reinforcement Learning	https://www.youtube.com/watch?v=ewkm38skUlY&list=PLEAYkSg4uSQ0Hkv_1LHlJtC_wqwVu6RQX
Unit-III	Introduction to Python	https://www.youtube.com/watch?v=eoPsX7MKfe8&list=PLIdgECt554OVFKXRpo_kuI0XpUQKk0ycO
Unit-IV	2D & 3D Data Visualization	https://www.youtube.com/watch?v=eFByJkA3ti4

Course Code	**EL-MCA-209A**				
Category	Experiential Learning				
Course Title	**Software Lab-6**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • Understand fundamental web technologies including HTML, CSS, JavaScript, XML, and server-side scripting for static and dynamic web development. • Develop web applications using client-server architecture, enhancing interactivity and data handling through JavaScript, JSP, and Servlets. • Apply web design principles to create responsive, user-friendly interfaces and structured web documents using HTML and CSS. • Implement data validation, session management, and database connectivity in web applications using JavaScript, JSP, and backend programming techniques.				
Internal Assessment	50 Marks				
External Practical	50 Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Illustrate interactive web pages using HTML forms, JavaScript validation, and CSS styling to create responsive and usable interfaces.	Level 3: Apply
CO2	Analyze client-side scripting with server-side technologies to identify appropriate use cases in full-stack web application development.	Level 4: Analyze
CO3	Assess the effectiveness of web pages and applications based on usability, structure, functionality, and adherence to web standards.	Level 5: Evaluate
CO4	Design and build a complete static and dynamic web application integrating front-end and back-end components using taught technologies.	Level 6: Create

List of Experiments

Sr. No.	Contents
1	Write a HTML program for the demonstration of Lists. Unordered List, Ordered List, Definition List, Nested List.
2	Write a HTML program for demonstrating Hyperlinks. • Navigation from one page to another. • Navigation within the page
3	Write a HTML program for time-table using tables.
4	Write a HTML program to develop a static Home Page using frames. • Write a HTML program to develop a static Registration Form. • Write a HTML program to develop a static Login Page
5	Write a HTML program to develop a static Web Page for Catalog. • Write a HTML program to develop a static Web Page for Shopping Cart.
6	Write HTML for demonstration of cascading stylesheets. • Embedded stylesheets. • External stylesheets. • Inline styles.
7	Write a javascript program to validate USER LOGIN page.
8	Write a javascript program for validating REGISTRATION FORM
9	Write a program for implementing XML document for CUSTOMER DETAILS. • Write an internal Document Type Definition to validate XML for CUSTOMER DETAILS?
10	Write a JSP that reads parameters from user login page.
11	Write a JSP that reads a value, creates a cookie and retrieves it.
12	Write a servlet that connects to the database and retrieves the data and displays it.

Suggested Readings:

- Deitel H.M., Deitel P.J., Internet & World wide Web: How to program, Pearson Education.
- Kogent Learning, Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML, AJAX – Black Book, Wiley India Pvt. Ltd.
- Boronczyk, Naramore, Beginning PHP, Apache, MySQL Web Development, Wiley India Pvt.Ltd.
- Thomas Powell, Ajax: The Complete Reference, McGraw Hill.

Useful Video links:

Unit No.	Topics	Links
1.	INTRODUCTION OF WEB BROWSER,HTML, CSS	https://www.youtube.com/live/AnD2xH72jHg?feature=shared
2.	Java script	https://www.nptelvideos.com/video.php?id=2352&c=6
3.	PHP	https://youtu.be/OQ14NjbEXJM?feature=shared
4.	INTRODUCTION TO AJAX	https://youtu.be/XdXbDw7LwBE?feature=shared

Course Code	**EL-MCA-209A**				
Category	Experiential Learning				
Course Title	**Software Lab-6 Based on ANDROID**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • To understand the fundamentals of Android architecture and application components. • To design and implement user interfaces using Android UI elements and layouts. • To develop mobile applications with data storage, SQLite, and internet connectivity. • To integrate device features such as camera, GPS, and background services in Android apps.				
Internal Assessment	50 Marks				
External Practical	50 Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Examine functional Android apps using UI elements, storage, services, and device features like camera, location, and notifications.	Level 3: Apply
CO2	Illustrate between storage methods, threading models, and user interaction patterns in various Android development scenarios.	Level 4: Analyze
CO3	Assess Android app performance, user experience, and efficiency by testing features like alarms, menus, and internal or external storage.	Level 5: Evaluate
CO4	Design and implement complete Android applications integrating UI, SQLite, multimedia, background tasks, and device services creatively.	Level 6: Create

List of Experiments

Sr. No.	Contents
1	Design an application representing a simple calculator.
2	Develop an application for working with Menus and Screen Navigation.
3	Develop an application for working with Notifications.
4	Develop an application demonstrating Internal Storage to store private data on the device memory.
5	Design a simple to-do list application using SQLite.
6	Develop an application for connecting to the internet and sending email.
7	Develop an application for working with graphics and animation.
8	Develop an application for working with device camera.
9	Develop an application for working with location-based services.
10	Using Worker thread writes Android code for a click listener that downloads an image from a separate thread and displays it in an Image View.
11	Develop an Android Application that creates Alarm Clock.
12	Develop an Android Application that writes data to the SD Card.

Suggested Readings:

- Zigurd Mednieks, Laird Dornin, G, BlakeMeike and Masumi Nakamura: Programming Android, O'Reilly Publications.
- Wei-Meng Lee: Beginning iPhone SDK Programming with Objective-C, Wiley India Ltd.
- James C.S: Android Application development, CENGAGE Learning.
- Gargenta M., Nakamura M.: Learning Android, O'Reilly Publications.
- Reto Meier: Professional Android 2 Application Development, WROX Publication- Wiley-India.
- James Edward: J2ME: The Complete Reference, James Edward – Publication.
- Chris Haseman: Android Essentials, Apress Publication.
- Mark L Murphy: Beginning Android - Wiley India Pvt Ltd.
- Sayed Y Hashimi and Satya Komatineni: Pro Android – Wiley India Pvt Ltd.
- Lauren Darcey, Shane Conder: Android Wireless Application Development, 2nd edition –Pearson Education.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Mobile Application Development	https://youtu.be/swiXnLo5nL8?si=PGsZiXQpGQSJEyzh
Unit-II	Introduction to Android	https://youtu.be/fzQcQV0UCUM?si=HwvV3Sw4YvYPb5yy
Unit-III	Android Application	https://youtu.be/m2vLrtxyGuE?si=-55381gRS71mbtzT
Unit-IV	Using Google Maps, GPS and Wi-Fi Integration	https://youtu.be/PEdjbn2B-rY?si=eiJ6AEG84HuM2wH3

Course Code	**DSEC-MCA-211A**				
Category	Discipline Specific Elective Courses				
Course Title	**Cyber Security & Blockchain Technology**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand the Core Concepts of Cyber Security. • Develop Proficiency in Vulnerability Scanning and Network Security Tools. • Gain Expertise in Web Application Security and Ethical Hacking Techniques. • Explore Blockchain Technology and Its Applications in Cyber Security.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall cyber security basics, scanning tools, cybercrime types, laws, and blockchain fundamentals.	Level 1: Remember
CO2	Explain threats, scanning methods, firewall/VPN functions, cybercrimes, and blockchain principles.	Level 2: Understand
CO3	Apply tools like Nmap, Wireshark, Metasploit, and Sqlmap; configure firewalls; investigate crimes; implement blockchain basics.	Level 3: Apply
CO4	Analyze vulnerabilities, compare attack methods, evaluate legal aspects, and assess blockchain for data integrity and trust.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Cyber Security: Overview of Cyber Security, Internet Governance –Challenges and Constraints; Cyber Threats: Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage; Need for a Comprehensive Cyber Security Policy. Introduction to Vulnerability Scanning: Overview of vulnerability scanning, Open Port/Service Identification, Banner/Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples,OpenVAS, Metasploit.Network Vulnerability Scanning: Netcat, Socat; understanding Port and Services tools - Data pipe,Fpipe, WinRelay; Network Reconnaissance – Nmap, THC-Amap and System tools, Network Sniffersand Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping, Kismet.

Unit-II

Network Defense Tools: Firewalls and Packet Filters - Firewall Basics, Packet Filter VsFirewall; Network Address Translation (NAT) and Port Forwarding; Basics of Virtual Private Networks, Linux Firewall, Windows Firewall.

Web Application Tools: Scanning for web vulnerabilities tools- Nikto, W3af; HTTP utilities - Curl, OpenSSL; and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat; Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTCHydra

Unit-III

Cyber Crimes and Law: Introduction to Cyber Crimes, Types of Cybercrime, Hacking,Attack vectors, Cyberspace and Criminal Behavior, Digital Forensics, Realms of the Cyber world, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers asTargets, Contaminants and Destruction of Data, Indian IT ACT 2000.

Cyber Crime Investigation: Firewalls and Packet Filters, password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.

Unit-IV

Blockchain Technology: Cryptography - Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof; Blockchain Overview: Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain. Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin. Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

Suggested Readings:

- Mike Shema: Anti-Hacker Tool Kit, McGraw Hill
- Nina Godbole and Sunit Belpure: Cyber Security Understanding Cyber Crimes,ComputerForensics and Legal Perspectives, Wiley.
- Achyut S.Godbole: Data Communication and Networking, McGraw –Hill Education
- New Delhi.
- Forouzan: Data Communication and Networking (Global Edition) 5/e, McGraw HillEducation India.
- Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven
- Goldfeder: Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction,Princeton University Press.
- Wattenhofer: The Science of the Blockchain.
- Antonopoulos: Mastering Bitcoin - Unlocking Digital Cryptocurrencies.
- Satoshi Nakamoto: Bitcoin: A Peer-to-Peer Electronic Cash System
- Forouzan, B.A.: Cryptography & Network Security. Tata McGraw-Hill Education.
- Kahate, A. Cryptography and Network Security. McGraw-Hill Higher Ed.
- Peter Szor, The Art of Computer Virus Research and Defense, Symantec Press.
- Markus Jakobsson and Zulfikar Ramzan, Crimeware, Understanding New Attacksand Defenses, Symantec Press, 2008, ISBN: 978-0-321-50195-0.
- S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, 'Blockchain Technology:Cryptocurrency and Applications', Oxford University Press, 2019.
- Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to BlockchainTechnology and Blockchain Programming', CSI Publishing Platform, 2017.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Overview of Cyber Security	https://youtu.be/OYsY5B9pqYU?si=mIWU9xh-YmzwYZnB
	Overview of vulnerability scanning, Open Port/Service Identification	https://youtu.be/Mfwu4ZwAvos?si=utAAsh3o1_L-8UyT
Unit-II	Firewalls and Packet Filters	https://youtu.be/2YGUvopGkQc?si=-DQLPe_5ZFaqyVIk
	Web Application Tools	https://youtu.be/-lyr-vm9w5Q?si=HTDDopxjqbaEPiND
Unit-III	Types of Cybercrime	https://www.youtube.com/live/BP52YjPi27Y?si=WfWuCvZ6AI-ZRBw1
	Trojan and backdoors, Steganography, DOS and DDOS attack	https://www.youtube.com/live/B_rM-ntOr5w?si=JzLAh7XfLIc5d6MR
Unit-IV	Cryptography	https://youtu.be/iTVyKbDCJrA?si=gGxNvA5LUHwNqLfs
	Domain Name Service and future of Blockchain	https://youtu.be/4aLdi_2rS3M?si=OWU5LgzIBl2A6BkU

Course Code	**DSEC-MCA-213A**				
Category	Discipline Specific Elective Courses				
Course Title	**Software Testing & Quality Assurance**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand and Apply Software Testing Strategies and Processes. • Master dynamic, static, regression, and validation testing techniques. • Explore object-oriented and web application testing methods. • Learn software quality standards like ISO 9000, CMM, and CMMI.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall key concepts of testing strategies, techniques, object-oriented/web testing, and quality standards like ISO and CMM.	Level 1: Remember
CO2	Explain testing processes, integration/system testing, web testing types, Rational Rose features, and quality management roles.	Level 2: Understand
CO3	Apply black-box and white-box testing, debugging, object-oriented testing, and quality assurance using ISO and CMMI.	Level 3: Apply
CO4	Analyze software risks, evaluate testing tools and metrics, assess web testing methods, and review QA frameworks.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Testing Strategy and Environment: Minimizing Risks, Writing a Policy for SoftwareTesting, Economics of Testing, Testing-an organizational issue, Management Support for Software Testing, Building a Structured Approach to Software Testing, Developing a Test Strategy Building Software Testing Process: Software Testing Guidelines, workbench concept, Customizing the Software Testing Process, Process Preparation checklist – Software Testing Techniques: Dynamic Testing – Black Box testing techniques, White Box testing techniques, Static testing, Validation Activities, Regression testing.

Unit-II

Software Testing Strategies: Approach, Issues; integration, incremental, System, alpha,Beta testing etc; Comparative evaluation of techniques: Testing tools; Dynamic analysistools, test data generators, Debuggers, test drivers etc.Technical Metrics for Software: Quality Factors, framework**;** Metrics for analysis, design,testing source code.

Unit-III

Object Oriented Testing: Introduction to Object Oriented testing, Path Testing, State BasedTesting, Class Testing, Testing Web Applications: Web testing, Functional Testing, User interface Testing, Usability Testing,

Configuration and Compatibility Testing, Security Testing, Performance Testing, Database testing, Post Deployment Testing. Rational Rose Software: Introduction, Features, Various types of software testing using Rational Rose.

Unit-IV

Software Quality Assurance and Standards: Software Quality, SoftwareQualityChallenges, Software Quality factors. Software Quality Assurance: concept, components, importance and essence; FTR, structured walk-through technique etc. Software Quality Management Standards, Management and its role in Software Quality Assurance, Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI.

Suggested Readings:

- Meyers, G.: The art of Software Testing, Wiley-Inter-Science.
- Deutsch, Willis: Software Quality Engineering: A Total Technical and Management
- Approach, Prentice Hall.
- Pressman: Software Engineering, TMH.
- Gill, Nasib Singh: Software Engineering: Reliability, Testing and Quality Assurance,
- Khanna Book Publishing Co.(P) Ltd, N. Delhi
- Ghazzi, Carlo: Fundaments of Software Engineering, PHI.
- Chhillar Rajender Singh: Software Engineering: Testing, Faults, Metrics, Excel
- Books, New Delhi.
- Jalote, Pankaj: An Integrated Approach to Software Engineering, Narosa Publications.
- Doug Bell, Ian Murrey, John Pugh: Software Engineering-A Programming Approach, Prentice Hall.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Dynamic Testing – Black Box testing techniques, White Box testing techniques,	https://youtu.be/reTh1y7ZH_A?si=5v-nfbJeJ1i45yJj
Unit-II	Integration test strategy	https://youtu.be/jBtipG06R04?si=yCx-wn-tTHHQhFuv
Unit-III	Path testing	https://youtu.be/TAFhCV721tY?si=K0R-xMV3V1xb7m8i
	White box testing	https://youtu.be/pXkCkRgPFrc?si=lo7GVHD1HgVXXCEF
Unit-IV	Software Quality Assurance	https://youtu.be/KqDlDubS-OU?si=mq5chYjmYK3_bHht

Course Code	**DSEC-MCA-215A**				
Category	Discipline Specific Elective Courses				
Course Title	**Android Mobile Application Development**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand mobile application fundamentals, architecture, and resource management for efficient, responsive, and portable software design. • Develop Android apps using Activities, Intents, UI components, multimedia, data storage, and location-based services with Android SDK. • Explore advanced Android features like sensors, camera, Bluetooth, maps, client-server apps, concurrency, and deployment processes. • Gain foundational knowledge of Flutter for cross-platform development and compare it with native Android application development techniques.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define key concepts of mobile applications, architecture, tools, and Android components for effective development understanding.	Level 1: Remember
CO2	Explain mobile software engineering principles, Android framework, and application models including UI design and device integration techniques.	Level 2: Understand
CO3	Apply Android applications using activities, services, intents, storage, sensors, and UI components across multiple screen formats.	Level 3: Apply
CO4	Analyze application workflows, memory management strategies, and component interactions in Android to optimize resource usage and performance.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Mobile Applications, Characteristics and Benefits, Application Model, Infrastructure and Managing Resources, Mobile Software Engineering, Frameworks and Tools, Mobile devices Profiles. Application Design: Memory Management, Design patterns for limited memory, Work flow for Application Development, Techniques for composing Applications, Dynamic Linking, Plug-ins and rules of thumb for using DLLs, Concurrency and Resource Management.

Unit-II

Google Android: Introduction, JDK & ADK, Android Application Architecture, Traditional Programming Model and Android, Activities, Intents, Tasks, Services. Android Framework: GUI and MVC Architecture, Fragments and

Multi-platform development, Creating Widgets: Layouts, Shadows, Gradients; Applications with multiple screens. Development: Intents and Services, Storing and Retrieving data, Graphics and Multimedia, Telephony, Location based services, Packaging and Deployment.

Unit-III

Android Applications: Working with Android, Various life cycles for applications, building a User Interface: Blank UI, Folding and Unfolding a scalable UI, Making Activity, Fragment, Multiple layouts; Content Provider, Location and Mapping: location-based services, Mapping, Google Maps activity, Working with Map View and Map Activity; Sensors and Near Field Communication; Native libraries and headers, Building client server applications.

Unit-IV

Using Google Maps, GPS and Wi-Fi Integration, Android Notification, Audio manager, Bluetooth; Camera and Sensor integration, Sending SMS, Phone Calls. Runtime Environment for Applications, Callbacks and Override in application, Concurrency, Serialization, Application Signing, API keys for Google Maps, Publishing Android Application; Introduction to Flutter, Android features, UI, implementation.

Suggested Readings:

- Zigurd Mednieks, Laird Dornin, G, BlakeMeike and Masumi Nakamura: Programming Android, O'Reilly Publications.
- Wei-Meng Lee: Beginning iPhone SDK Programming with Objective-C, Wiley India Ltd.
- James C.S: Android Application development, CENGAGE Learning.
- Gargenta M., Nakamura M.: Learning Android, O'Reilly Publications.
- Reto Meier: Professional Android 2 Application Development, WROX Publication- Wiley-India.
- James Edward: J2ME: The Complete Reference, James Edward – Publication.
- Chris Haseman: Android Essentials, Apress Publication.
- Mark L Murphy: Beginning Android - Wiley India Pvt Ltd.
- Sayed Y Hashimi and Satya Komatineni: Pro Android – Wiley India Pvt Ltd.
- Lauren Darcey, Shane Conder: Android Wireless Application Development, 2nd edition –Pearson Education.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Mobile Application Development	https://youtu.be/swiXnLo5nL8?si=PGsZiXQpGQSJEyzh
Unit-II	Introduction to Android	https://youtu.be/fzQcQV0UCUM?si=HwvV3Sw4YvYPb5yy
Unit-III	Android Application	https://youtu.be/m2vLrtxyGuE?si=-55381gRS71mbtzT
Unit-IV	Using Google Maps, GPS and Wi-Fi Integration	https://youtu.be/PEdjbn2B-rY?si=eiJ6AEG84HuM2wH3

Course Code	**DSEC-MCA-217A**				
Category	Discipline Specific Elective Courses				
Course Title	**Full Stack Development**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand web browsers, static web design with HTML5 and CSS3, and explore concepts like buffering, caching, and web security. • Develop interactive web pages using JavaScript, including DOM manipulation, event handling, user input processing, form validation, and object handling. • Learn server-side programming with PHP and MySQL, covering form processing, sessions, cookies, dynamic content generation, and database connectivity. • Explore AJAX for asynchronous communication, integrate PHP with AJAX, and ensure secure, accessible, and responsive web applications.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall foundational web development concepts, HTML5, CSS3 properties, JavaScript syntax, PHP basics, and AJAX communication techniques.	Level 1: Remember
CO2	Describe the behavior of client-side and server-side technologies including DOM, form handling, session management, and asynchronous communication.	Level 2: Understand
CO3	Apply interactive websites using HTML, CSS, JavaScript, PHP, and AJAX with dynamic content and user-driven functionality.	Level 3: Apply
CO4	Differentiate between synchronous and asynchronous applications, scripting versus markup, and cookie-based versus session-based user data handling.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Web browsers and its functions, web optimizations; Static page design; designing static web pages with HTML5.0-HTML basic, multimedia, Graphics, Form tags, CSS 2.0 concept and its properties & CSS 3.0 properties i.e. borders, backgrounds, fonts, text effects, Buffering, Weblog, Web Cache Poisoning.

Unit-II

JavaScript: Document Object Model (DOM), Obtaining user inputs, memory concepts, Operators, Control Structures, Looping constructs, break, continue statements, Programmer defined functions, Scoping rules, Recursion and iteration, Array declaration and allocation, passing arrays to function, Objects: String, Date, Boolean, Window, document; using cookies, form validation in Java Script, Handling Events Using JavaScript.

Unit-III

PHP: Installing and Configuring MySQL and PHP, Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops, Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, cookies, Session, dynamic contents.

Unit-IV

Introduction to AJAX: Exploring different web technologies, creating a simple AJAX application, interacting with the Web Server Using the XMLHttpRequest Object, Create an XMLHttpRequest Object, Interact with the Web Server. Differentiating AJAX and Non-AJAX application. Working with PHP and AJAX: Introduction, Process Client Requests, Accessing Files Using PHP, Implementing Security and Accessibility in AJAX applications: Introduction, Secure AJAX Applications, and Accessible Rich Internet Applications.

Suggested Readings:

- Deitel H.M., Deitel P.J., Internet & World wide Web: How to program, Pearson Education.
- Kogent Learning, Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML, AJAX – Black Book, Wiley India Pvt. Ltd.
- Boronczyk, Naramore, Beginning PHP, Apache, MySQL Web Development, Wiley India Pvt.Ltd.
- Thomas Powell, Ajax: The Complete Reference, McGraw Hill.

Useful Video links:

Unit No.	Topics	Links
Unit-I	INTRODUCTION OF WEB BROWSER, HTML, CSS	https://www.youtube.com/live/AnD2xH72jHg?feature=shared
Unit-II	Java script	https://www.nptelvideos.com/video.php?id=2352&c=6
Unit-III	PHP	https://youtu.be/OQ14NjbEXJM?feature=shared
Unit-IV	INTRODUCTION TO AJAX	https://youtu.be/XdXbDw7LwBE?feature=shared

Course Code	**DSC-MCA-202A**				
Category	Discipline Specific Courses				
Course Title	**Advance Software Engineering**				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand and apply emerging software engineering practices, including Aspect-Oriented Development, Agile Methods, Security Engineering, and Component-Based Software Engineering. • Gain proficiency in Agile development processes, covering Scrum, Extreme Programming (XP), Agile Risk Management, Agile Architecture, and Agile Testing techniques. • Develop skills for engineering web-based applications and applying Cleanroom Software Engineering and Component-Based Software Engineering methods, including domain engineering and economic considerations. • Explore and implement DevOps principles and tools to automate development workflows, integrate continuous deployment pipelines, and utilize platforms like Azure DevOps and AWS DevOps.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall key concepts, terminology, and tools in data mining, big data, Hadoop, and data analytics using R programming techniques.	Level 1: Remember
CO2	Explain the functioning of data mining algorithms, Hadoop architecture, and data analytics workflows across various real-world applications and datasets.	Level 2: Understand
CO3	Implement data mining techniques, Hadoop operations, and R-based analytics to analyze, clean, and transform complex datasets efficiently.	Level 3: Apply
CO4	Analyze various data processing models, mining methods, and analytical techniques to determine suitable approaches for specific data-driven problems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Emerging Software Engineering Practices: Aspect Oriented Software Development, Agile Methods, Security Engineering, Client/Server Software Engineering, Software Engineering Aspects of Programming Languages.

Cleanroom Software Engineering: Approach, functional specification, design and testing.

Component-Based Software Engineering: Software Component and its Elements, Component Models - Concepts and Principles, COTS Myths, CBSE process, domain engineering, component-based development, classifying and retrieving components, and economics of CBSE.

Engineering Web Applications: Web-based applications and their attributes, Web Engineering process, framework for Web Engineering, formulating, analysing web-based systems, design and testing for web-based applications.

Unit-II

Agile Software Development: Basics and Fundamentals of Agile Process Methods, Values of Agile, Principles of Agile, stakeholders, Challenges.

Agile and Scrum Principles: Agile Manifesto, Twelve Practices of Extreme Programming (XP), Scrum Practices, Applying Scrum. Need of scrum, working of scrum, advanced Scrum Applications, Scrum and the Organization, scrum values.

Agile Requirements: User Stories, Backlog Management. **Agile Architecture:** Feature Driven Development. **Agile Risk Management:** Risk and Quality Assurance, Agile Tools.

Agile Testing: Agile Testing Techniques, Test-Driven Development, User Acceptance Test.

Unit-III

Agile Management: Agile Metrics and Measurements, Agile approach to estimating and project variables, Agile Measurement.

Agile Control: the 7 control parameters. Agile approach to Risk, Agile approach to Configuration Management, Atern Principles, Atern Philosophy, Rationale for using Atern, Refactoring, Continuous integration, Automated Build Tools.

Scaling Agile for Large Projects: Scrum of Scrums, Team collaborations, Scrum, estimate a Scrum Project, Track Scrum Projects, Communication in Scrum Projects, Best Practices to Manage Scrum.

Unit-IV

DevOps: History of DevOps, DevOps vs Agile, Advantages and Disadvantages of DevOps, DevOps Stakeholders, Architecture, Components and features of DevOps, SDLC models of DevOps, Workflow and Principles of DevOps, DevOps tools, DevOps automation and automation tools, Pipeline and Methodology, Azure DevOps, AWS DevOps.

Laboratory Work: Exploring the tools related to Agile Development and DevOps, and developing small projects using this technology.

Suggested Readings:

- Roger S. Pressman: Software Engineering a Practitioners Approach, McGraw-Hill, Latest Edition.
- Robert C. Martin: Agile Software Development, Principles, Patterns, and Practices Alan Apt Series.
- Cohen Mike: Succeeding with Agile: Software Development Using Scrum, Pearson.
- Software Engineering for Embedded Systems: Methods, Practical Techniques, and Applications, Robert Oshana, Mark Kraeling, Newnes Publisher.
- Kristin Runyan: Introduction to Agile Methods Sondra Ashmore, Addison-Wesley.
- Pekka Abrahams, OutiSalo, Jussi Ronkainen and Juhani Warsta: Agile Software Development Methods: Review and Analysis.
- Jim Highsmith, Agile Project Management: Creating Innovative Products, Second Edition, Addison-Wesley Professional.
- James A. Crowder, Agile Project Management: Managing for Success, Shelli Friess, Springer.
- Andrew Stellman, Jennifer Greene, Learning Agile: Understanding Scrum, XP, Lean, and Kanban, O Reilly
- Sricharan Vadapalli, DevOps: Continuous Delivery, Integration, and Deployment with DevOp, Packt.

- Janet Gregory, Lisa Crispin, More Agile Testing: Learning Journeys for the Whole Team, Addison Wesley.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Agile Methods	https://www.youtube.com/watch?v=x90kIAFGYKE
Unit-II	Agile Testing	https://www.youtube.com/watch?v=jRs-aFETAXY
	Agile and Scrum Principles	https://www.youtube.com/watch?v=gWYw4gKgmPk
Unit-III	Agile Management	https://www.youtube.com/watch?v=zyGfLajeWmw
Unit-IV	DevOps	https://www.youtube.com/watch?v=2N-59wUIPVI

Course Code	**DSC-MCA-204A**				
Category	Discipline Specific Courses				
Course Title	**IoT & Sensor Networks**				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand the foundational concepts of the Internet of Things (IoT), including its architecture, protocols, data management, and the technologies enabling IoT and M2M communications. • Develop skills in IoT system design and prototyping, covering cloud-based data collection and storage, embedded device programming (Arduino), and secure communication using protocols like MQTT. • Learn about wireless sensor networks (WSNs), including their architecture, enabling technologies, design principles, optimization goals, and gateway concepts. • Explore communication protocols for WSNs, focusing on physical layer considerations, MAC protocols, routing protocols, address management, and techniques for energy-efficient networking.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall key concepts, protocols, components, and technologies involved in IoT, cloud computing, wireless sensor networks, and communication models.	Level 1: Remember
CO2	Explain IoT architectures, cloud-based services, WSN principles, and protocol operations involved in device communication, data transmission, and security.	Level 2: Understand
CO3	Apply IoT applications by interfacing sensors, using Arduino, programming MQTT clients, and deploying cloud services for data storage and processing.	Level 3: Apply
CO4	Analyze communication protocols, sensor network architectures, and cloud models to determine optimal solutions for specific IoT applications.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

IoT Overview: Introduction to Internet of Things, IoT Applications, IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT, M2M communication, Examples of IoT. Modified OSI Model for the IoT/M2M Systems, data enrichment, data consolidation and device management at IoT/M2M Gateway, web communication protocols used by connected IoT/M2M devices, Message communication protocols (CoAP-SMS, CoAPMQ, MQTT,XMPP) for IoT/M2M devices.

Architecture and Design Principles for IoT: Internet connectivity, Internet-based communication,IPv4, IPv6,6LoWPAN protocol, IP Addressing in the IoT, Application layer protocols: HTTP, HTTPS,FTP,TELNET and ports.

Unit-II

Data Collection, Storage and Computing using a Cloud Platform: Introduction, Cloud computing paradigm for data collection, storage and computing, Cloud service models, IoT Cloud- based data collection, storage and computing services using Nimbits.

Prototyping and Designing Software for IoT Applications: Introduction, Prototyping Embedded device software, Programming Embedded Device Arduino Platform using IDE, Reading data from sensors and devices, Devices, Gateways, Internet and Web/Cloud services software development.

Programming MQTT clients and MQTT server.

IoT Security: Introduction to IoT privacy and security, Vulnerabilities, Security requirements and threat analysis, IoT Security Tomography and layered attacker model.

Unit-III

Wireless Sensor Networks: Overview of WSNs, Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks.

Architectures: Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture Sensor Network Scenarios, Optimization Goals and Figures of Merit, Design principles for WSNs, Service interfaces of WSNs, Gateway Concepts.

Unit-IV

Communication Protocols: Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols and Wakeup Concepts - S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Contention based protocols (CSMA,PAMAS), Schedule based protocols (LEACH, SMACS, TRAMA) Address and Name Management in WSNs, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing, Hierarchical Networks by Clustering.

Suggested Readings:

- Raj Kamal: Internet of Things-Architecture and design principles, McGraw Hill Education.
- Holger Karl & Andreas Willig: Protocols and Architectures for Wireless Sensor Networks, John Wiley.
- Feng Zhao & Leonidas J. Guibas: Wireless Sensor Networks- An Information Processing Approach, Elsevier.
- Kazem Sohraby, Daniel Minoli, &TaiebZnati: Wireless Sensor NetworksTechnology, Protocols, And Applications, John Wiley.
- Anna Hac, Wireless Sensor Network Designs, John Wiley.
- Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle: From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, Academic Press.
- Peter Waher, Learning Internet of Things, PACKT publishing, BIRMINGHAM – MUMBAI
- Bernd Scholz-Reiter, Florian Michahelles: Architecting the Internet of Things, Springer.
- Daniel Minoli: Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, Willy Publications
- C.S Raghavendra, Krishna M.Sivalingam, Taiebznati: Wireless Sensor Networks, Springer Science.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Internet of Things	https://nptel.ac.in/courses/106105166
	Internet connectivity	https://youtu.be/GHUR_GfQQsQ?si=qUES9QKnjrnavXdX
Unit-II	Prototyping and Designing Software for IoT Applications	https://www.youtube.com/watch?v=urUBLmXFKl0
Unit-III	Wireless Sensor Networks	https://www.youtube.com/watch?v=GUSrkWJ_Z2g
Unit-IV	Communication Protocols	https://www.youtube.com/watch?v=TrFaCBV7joY

Course Code	**DSC-MCA-206A**				
Category	Discipline Specific Courses				
Course Title	**Web Development Using .Net Framework**				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • To understand the fundamentals of web development using the .NET framework, including its architecture, execution model, and development tools such as IIS, SQL Server, and Visual Studio. • To develop proficiency in object-oriented programming concepts such as classes, inheritance, polymorphism, interfaces, and exception handling using C#. • To design and implement Windows-based applications with user interfaces and database connectivity using ADO.NET for data access and manipulation. • To build dynamic and interactive web applications using ASP.NET, implement state management techniques, and develop secure web services with authentication and authorization.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall .NET architecture, C# syntax, web technologies, and ADO.NET components used in developing Windows and web applications.	Level 1: Remember
CO2	Explain object-oriented programming concepts, .NET framework components, and ASP.NET features including state management and data controls.	Level 2: Understand
CO3	Apply C# programs, implement Windows forms, and connect to SQL Server using ADO.NET and Visual Studio tools.	Level 3: Apply
CO4	Analyze between monolithic and component-based applications, and evaluate server-side vs. client-side technologies in web development.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Overview of Web Development: Introduction, .NET Overview, Assemblies (monolithic vs. component-based applications), Execution Model, Client-Side vs. Server-Side Programming, Web Technologies, Development Environment Setup, IIS, SQL Server and Visual Studio.

Introduction to .NET Framework: Microsoft .NET Platform, Design, Goals and Overview, .NET Architecture, Console, Environment, IL, JIT, .NET framework Class library (System, Collections, I/O, Networking, Threading, Transactions, Exceptions), Common Language Runtime, CLR Execution, Common Type System, Common Language Specification, Managed and Unmanaged code.

C# Programming: Introduction to C#, program structure; Variables and Data types: Initialization of Variables, Variable Scope, Constants, Value Types and Reference Types, CTS Types. Operators. Conditional Statements, Loops. Arrays. Strings.

Structures: Defining Structs, Creating Structs, Creating Enums

Unit-II

Object Oriented Programming: Objects and Classes, Methods and Properties, Constructors and Destructors.

Inheritance: Introduction, Types of Inheritance, Implementation versus Interface Inheritance, Multiple Inheritance.

Polymorphism: Abstract Classes Implementing Polymorphism by Method Overloading & Method Overriding.

Interfaces: Defining and Implementing Interfaces, Derived Interfaces, Accessing Interfaces, Overriding Interfaces.

Exception Handling: Exception Classes, Standard Exceptions, User Defined Exceptions. Delegates, Events and Attributes.

Unit-III

Building Windows Based Applications: Standard Controls: Components, Forms, Menus and Dialogues, Validating user inputs.

Databases and Data Access Using ADO.NET: Overview of ADO.NET, Accessing Data, Using Dataset Objects and Updating Data Binding, Viewing, and Filtering Data, Connecting with the Database.

Unit-IV

ASP.NET: Introduction to ASP.NET, Configuring ASP.NET Applications, Programming Model.

ASP.NET Frameworks: Code Behind, Page Directives, Page Events, Post Back.

ASP.NET Controls: Basic Web Server Controls, Data List Web Server Controls, Web Server Controls: Calendar Control, Ad rotator Control, Validation Controls, Grid View Controls.

Performing Data Access: Data bound Controls, List Controls, Tabular & Hierarchical Data bound Controls, Data source Controls.

State Management, Web Services: View State, Session, Cookies, Application, Hidden Field; Authentication & Authorization; Developing Secure Web Services.

Suggested Readings:

- Jeffrey Richter, Francesco Balena: Applied .Net Framework Programming in MS VB.Net, TMH Publication.
- Herbert Schildt: Complete Reference C#, TMH Publication.
- Michael Halvorsan: Microsoft Visual Basic.NET step by step, PHI Publication.
- G.Andew Duthie: Microsoft ASP.Net With C#.Net step by step, PHI Publication.
- Daniel Geron: Programming for Beginners: This Book Includes: SQL, C++, C#, Arduino Programming, Daniel Geron.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Client-Side vs. Server-Side Programming	https://www.youtube.com/watch?v=XlryaovT_3k
Unit-II	Inheritance	https://www.youtube.com/watch?v=PaqAhlb5XVw&list=PLLy_2iUCG87Ah844iZW3w3nzWSTA8KSZA&index=14
Unit-III	Using Dataset Objects and Updating Data Binding	https://www.youtube.com/watch?v=meWQLWq7QSE
Unit-IV	State Management, Web Services	https://www.youtube.com/watch?v=Ho2bpbqpkiM

Course Code	**DSEC-MCA-214A**				
Category	Discipline Specific Courses				
Course Title	**Artificial Intelligence**				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • To provide a foundational understanding of Artificial Intelligence. • To develop an in-depth knowledge of expert systems and knowledge representation techniques. • To introduce students to advanced computational intelligence approaches. • To enable practical application of AI techniques across diverse domains.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall AI fundamentals, expert systems, knowledge types, neural and fuzzy systems, and applications.	Level 1: Remember
CO2	Explain AI problem-solving, expert system design, knowledge acquisition, neural learning, GAs, and fuzzy inference.	Level 2: Understand
CO3	Apply search methods, knowledge representation, ANN and GA models, and fuzzy logic in control tasks.	Level 3: Apply
CO4	Analyze AI strategies, expert system processes, inference techniques, PSO/ACO, and fuzzy-neuro system applications.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Artificial Intelligence: Definition, history and applications of AI; Problemsolving: Definingthe problem as state space search, Production System, Problem characteristics; Search techniques: Brute Force and Heuristic Search.

Expert System: Definition, role of knowledge, architecture and life cycle of Expert System.

Unit-II

Knowledge &Its Representation: Types of knowledge, Knowledge acquisition and its techniques, Knowledge engineering, Cognitive behavior; Knowledge representation: Level of representation; Knowledge representation schemes: Formal logic, Inference Engine, Semantic net, Frame, Scripts.

Perception: Sensing, Speech recognition, Vision, Action

Unit-III

Computational Intelligence: Introduction to Computational Intelligence, Biological and Artificial Neural Network (ANN), artificial neural network models; learning in artificial neural networks; neural network and its

applications.

Evolutionary Computation: Fundamentals of evolutionary computation, Design and Analysis of Genetic Algorithms, Evolutionary Strategies, comparison of GA and traditional search methods. Genetic Operators and Parameters, Genetic Algorithms in Problem Solving; Optimization: Particle Swarm Optimization, Ant Colony Optimization, Artificial Immune Systems; Other Algorithms: Harmony Search, Honey-Bee Optimization, Memetic Algorithms, Co-Evolution, Multi-Objective Optimization, Tabu Search,Constraint Handling.

Unit-IV

Fuzzy Systems: Crisp sets, Fuzzy sets: Basic types and concepts, characteristics andsignificance of paradigm shift, Representation of fuzzy sets, Operations, membership functions, Classical relations and fuzzy relations, fuzzyfication, defuzzyfication, fuzzy reasoning, fuzzy inference systems, fuzzy control system, fuzzy clustering, applications of fuzzy systems.Neuro-fuzzy systems, neuro-fuzzy modeling; neuro-fuzzy control.

Applications: Pattern Recognition, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing.

Suggested Readings:

- Rich Elaine and Knight Kevin: Artificial Intelligence, Tata McGraw Hill.
- M. Mitchell: An Introduction to Genetic Algorithms, Prentice-Hall.
- J.S.R.Jang, C.T.Sun and E.Mizutani: Neuro-Fuzzy and Soft Computing, PHI,
- Pearson Education.
- Timothy J.Ross: Fuzzy Logic with Engineering Applications, McGraw-Hill.
- Davis E.Goldberg: Genetic Algorithms: Search, Optimization and MachineLearning, Addison Wesley.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Artificial Intelligence	https://youtu.be/GHpchgLoDvI?si=Yupehj9mqMxeHHaL
Unit-II	Knowledge &Its Representation	https://youtu.be/zT0sGjOSPt8?si=aPh-4h591rWIzgPO
Unit-III	Computational Intelligence	https://youtu.be/XCPZBD9lbVo?si=Cvu36ZDVeM8a1k0S
Unit-IV	Fuzzy Systems	https://youtu.be/K7S3TgfqnX0?si=QZXSnDjodoEJcv3d

Course Code	**DSEC-MCA-216A**				
Category	Discipline Specific Courses				
Course Title	**Mixed Reality & Wearable Computing**				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand creative coding, open-source platforms, and hardware frameworks including Arduino, Raspberry Pi, and sensors. • Apply Python and C/C++ to interface software with real-world hardware using iterative methodology. • Explore cybernetics, humanistic intelligence, AR/VR, and smart wearable systems for interactive environments. • Analyze IoT, wearable computing, and augmented reality for innovative, real-time data-driven applications.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall fundamental concepts of creative coding, electronics, sensors, microcontrollers, and communication protocols used in IoT and AR systems.	Level 1: Remember
CO2	Explain how mobile, wearable, and embedded systems interact with hardware, software, and real-world inputs through various coding platforms.	Level 2: Understand
CO3	Apply functional prototypes using Arduino, Raspberry Pi, and sensors to interface software with physical devices in creative applications.	Level 3: Apply
CO4	Analyze digital and analog systems, communication protocols, and data processing techniques in IoT, AR, and wearable computing environments.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: History, Creative Coding Platforms, Open-Source Platforms, PIC, Arduino, Sketch, Raspberry Pi, Iterative coding methodology. Python Programming - Mobile phones and similar devices, Arm Devices, Basic Electronics (circuit theory, measurements, parts identification)

Sensors and Software: Understanding Processing Code Structure, variables and flow control, Interfacing to the Real World.

Unit-II

Software and Hardware Frameworks: Software-Open Frameworks as our IDE (C/C++) - Arduino Language (C/C++), Hardware- Desktop / Laptop / Raspberry Pi - How to approach a programming problem? Representing "reality" with computers. Digital vs. Analog circuits, audio, communication, etc. Analog to Digital Conversion (ADC) - Digital to Analog Conversion (DAC)– Microcontrollers - Communication – Serial & Parallel - Hardware to Hardware Communication - I2C/IIC (Inter-Integrated Circuit) - SPI (Serial Peripheral Interface) – Serial UART Communication.

Unit-III

Cybernetics and Humanistic Intelligence Wearables: Augmented Reality – Mixed Reality. AR versus VR - IoT and Wearables: Smart Cites and Wearable Computing as a form of urban design - Advanced I/O – open Frameworks: Live Network feeds (push and pull) - Data persistence (saving data and preferences) - Database interface (MySQL, SQLite, XML, PHP/Web) - Arduino: Wired/Wireless Networking (hardware vs. USB proxy) - Software serial (RS-232).

Unit-IV

Internet of Everything: Humanistic Intelligence; Wearable Computing and IoT (Internet of Things), Overview of Mobile and Wearable Computing, Augmented Reality, and Internet of Things. The fundamental axes of the Wearables + IoT + AR space - Free-roaming AR: Wearable Computing, Wireless, Sensing, and Meta sensing with light bulbs Phenomenal Augmented Reality: Real world physical phenomena as the fundamental basis of mobile and wearable AR.

Suggested Readings:

- Woodrow Barfield: Fundamentals of Wearable Computers and Augmented Reality, Second Edition.
- Omesh Tickoo, Ravi Iyer: Making Sense of Sensors: End-to-End Algorithms and Infrastructure Design.
- Josha Noble: Programming Interactivity, Second Edition.
- Raspberry Pi: Getting Started with Python, second edition, 2016

Useful Video links:

Unit No.	Topics	Links
Unit-I	Mixed Reality & Wearable Computing History, Creative Coding Platforms	https://www.youtube.com/watch?v=w8Dq8blTmSA
	Sensors and Software	http://digimat.in/nptel/courses/video/108108147/L01.html
Unit-II	Software and Hardware Frameworks	https://www.youtube.com/watch?v=AN5I6fFxyfs
Unit-III	Cybernetics and Humanistic Intelligence Wearables:	https://www.youtube.com/watch?v=dvBG4aknTX0
Unit-IV	Internet of Everything	http://digimat.in/nptel/courses/video/106105166/L02.html

Course Code	**DSEC-MCA-218A**				
Category	Discipline Specific Courses				
Course Title	**High Speed Networks**				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand Frame Relay, ATM protocols, and high-speed LAN technologies for modern network infrastructure. • Analyze network performance using stochastic models, queuing theory, and congestion control techniques. • Evaluate ATM traffic control, Integrated Services (IntServ), and Differentiated Services (DiffServ) architectures. • Explore QoS protocols and Internet routing principles for scalable, efficient network design and management.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall concepts of Frame Relay, ATM, Ethernet, LAN types, network protocols, QoS mechanisms, and internet routing fundamentals.	Level 1: Remember
CO2	Explain the structure, operation, and integration of high-speed networks, traffic models, and QoS-based internet communication protocols.	Level 2: Understand
CO3	Implement queuing models, flow control, and network routing algorithms to evaluate and manage performance in data communication systems.	Level 3: Apply
CO4	Analyze congestion control techniques, ATM traffic management models, and service differentiation methods for scalable, high-performance networks.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Frame Relay Network: Introduction, Packet-Switching Networks, Frame Relay Networks;

Asynchronous Transfer Mode: ATM Protocol Architecture and Logical Connection, ATM Cells, ATM Service Categories, ATM Adaption Layer;

High Speed LANs: Fast Ethernet LAN, Gigabit Ethernet, ATM LAN, Network Attached Storage (NAS), Wireless LAN and Wi-Fi, LAN Interoperability.

Unit-II

Network Performance Evaluation Models: Introduction, Overview of Probability and Stochastic Processes, Queuing Analysis, Self-Similarity Network Traffic.

Congestion Management: Congestion – An Overview, Effects of Congestion, Congestion Control, Traffic Management, Frame Relay Congestion Control, Flow Control Techniques, Error Control Techniques; TCP Traffic and Congestion Control: TCP Flow control, TCP Congestion Control, Performance of TCP over ATM.

Unit-III

ATM Traffic and Congestion Control: ATM Traffic and Congestion Control, Traffic Management Framework, ABR Traffic Management, GFR Traffic Management;

Integrated Services: Integrated Service (IntServ) Model, Flow and Service Description, Queuing Discipline, Integrated Services in IP-ATM Networks;

Differentiated Services: Differentiated Service Architecture, Scalability of DiffServ, DiffServ Functional Elements, Per-Hop Behavior (PHB), Models of DiffServ.

Unit-IV

Protocols for Quality of Service (QoS) Support: Multicasting, Multicast Transport Protocol (MTP), Resource Reservation Protocol (RSVP), Real-Time Transport Protocol (RTP), Multiprotocol Label Switching (MPLS), Subnet Bandwidth Management (SBM), QoS Architectures, QoS Support for Multicast;

Internet Routing Basics and Design: Basics of Graph Theory, Internet Routing Principles, Analysis of Shortest Route, Intra-Domain Routing Protocol, Border Gateway Protocol, Inter-Domain Routing Protocol (IDRP).

Suggested Readings:

- Kaven Pahlavan and Prashant Krishnamoorthy: Principles of Wireless Network, Prentice Hall of India.
- Adrian Farrel: The Internet and Its Protocols, Elsevier Publications.
- Larry L. Peterson and Bruce S.Davie: Computer Networks, Elsevier Publications.
- William Stallings: High-Speed Networks and Internets, Performance and Quality of Service, Pearson Publications.
- Behrouz A. Forouzan: Data Communications and Networking, Fourth Edition, McGraw Hill.
- B Muthukumaran: Introduction to High Performance Networks, McGraw-Hill
- Douglas E. Comer: Internetworking with TCP/IP Volume – I, Principles, Protocols, and Architectures, Fourth Edition, Pearson Education.
- Mahbub Hassan, Raj Jain: High Performance TCP/IP Networking, Concepts, Issues, and Solutions, Pearson Education.
- Andrew S. Tanenbaum: Computer Networks, PHI.
- James F. Kurose, Keith W. Ross: Computer Networking, A Top-Down Approach Featuring the Internet, Pearson Education.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Frame Relay Network	https://www.youtube.com/watch?v=DU7IZMciHJE
	Asynchronous Transfer Mode	https://www.youtube.com/watch?v=aQGeSDauRso
Unit-II	Network Performance Evaluation Models	http://kcl.digimat.in/nptel/courses/video/106106048/L21.html
	Congestion Management	https://www.youtube.com/watch?v=ZYIdYIt7W_g
Unit-III	ATM Traffic and Congestion Control Integrated Services	https://www.youtube.com/watch?v=ZYIdYIt7W_g
Unit-IV	Protocols for Quality of Service (QoS) Support	https://www.youtube.com/watch?v=utvwelCCfas
	Internet Routing Basics and Design	http://digimat.in/nptel/courses/video/106105084/L07.html

Course Code	**DSEC-MCA-220A**				
Category	Discipline Specific Courses				
Course Title	**Neural Networks & Deep Learning**				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand biological neurons, perceptron learning, and foundational concepts of feedforward and deep learning models. • Explore advanced neural network training methods, recurrent networks, and optimization algorithms for better performance. • Analyze convolutional networks, generative models, and recent advances like autoencoders and GANs. • Learn deep reinforcement learning concepts, algorithms, and practical implementations using TensorFlow and policy optimization.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall foundational concepts of neural networks, optimization algorithms, CNNs, RNNs, generative models, and deep reinforcement learning methods.	Level 1: Remember
CO2	Explain architectures and training techniques of deep networks including convolutional, recurrent, generative, and reinforcement learning models.	Level 2: Understand
CO3	Implement deep learning models using optimization methods for classification, sequence modeling, generative tasks, and reinforcement learning in Python.	Level 3: Apply
CO4	Analyze challenges in training deep networks, evaluate optimization strategies, and interpret results of deep reinforcement learning algorithms.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Biological neuron, Idea of Computational units, McCulloch-Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning algorithm, Linear separability; Convergence theorem for Perceptron Learning algorithm.

Feed forward Networks: Empirical Risk Minimization, regularizing a deep network, model exploration and hyper parameter tuning.

Deep Learning: Historical context and motivation for deep learning, Basic Supervised classification task, optimizing logistic classifier using gradient descent, Stochastic gradient descent, Momentum, and adaptive sub-gradient method.

Unit-II

Deep Neural Networks: Difficulty of training deep neural networks, Greedy layerwise training.

Better Training of Neural Networks: Newer optimization methods for neural networks (Adagrad, Adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in Neural network, Regularization methods.

Recurrent Neural Network: Bidirectional RNNs, Encoder-Decoder sequence to sequence architecture, Backpropagation through time, Long Short-Term Memory (LSTM), Gated Recurrent Units, Bidirectional LSTMs, Deep Recurrent networks.

Unit-III

Convolutional Neural Networks: Basics of convolutional neural networks, stacking, striding and pooling, Applications such as image and text classification, LeNet, AlexNet.

Generative Models: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, Gradient computations in RBMs, Deep Boltzmann Machines.

Recent Trends: Varitional Autoencoders (Undercomplete autoencoders, regularized autoencoders, sparse autoencoders, denoising autoencoders), Representational power, layer, size and depth of autoencoders, Stochastic encoders and decoders, Generative Adversarial Networks, Multi-Task Deep Learning, Multi-view Deep learning.

Unit-IV

Deep Reinforcement Learning: Basic concepts of Deep Reinforcement Learning (DRL), DRL process and RL approaches, Algorithms of DRL(Value Learning, Policy Learning),Q Learning algorithm and its implementation, Digging deeper into Q function, Deep Q Learning algorithm and its implementation with Tensorflow,Deep Q-Network, DRL Applications. Policy optimization: Introduction to policy-based methods, Policy Gradient; Model based RL, Recent Advances and Applications.

Suggested Readings:

- Ian Goodfellow: Deep Learning, MIT Press.
- Jeff Heaton: Deep Learning and Neural Networks, Heaton Research Inc.
- Mindy L Hall: Deep Learning, VDM Verlag.
- Li Deng, Dong Yu: Deep Learning: Methods and Applications (Foundations and Trends in Signal Processing), Now Publishers Inc.
- Richard S. Sutton and Andrew G. Barto: Reinforcement Learning: An Introduction, Second Edition, MIT Press.
- Wiering, Marco, and Martijn Van Otterlo: Reinforcement learning - Adaptation, Learning, and Optimization.
- Russell, Stuart J., and Peter Norvig: Artificial Intelligence: AModern Approach, Pearson Education Limited.
- Goodfellow, Ian, Yoshua Bengio, and Aaron Courville: Deep learning, MIT Press.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Neural Networks & Deep Learning Biological neuron, Idea of Computational units	http://kcl.digimat.in/nptel/courses/video/106106184/L01.html
	Feedforward Networks	https://www.youtube.com/watch?v=AASR9rOzhhA
Unit-II	Deep Neural Networks	
	Better Training of Neural Networks	https://www.youtube.com/watch?v=W3_yaf3HvHU
Unit-III	Convolutional Neural Networks	https://www.youtube.com/watch?v=cFgASecJGo8
	Generative Models	https://www.youtube.com/watch?v=IZgvgLy1wyg
Unit-IV	Deep Reinforcement Learning	https://www.youtube.com/watch?v=ZGmj8UgYuuk

Course Code	**EL-MCA-208A**					
Category	Experiential Learning					
Course Title	**Software Lab-7**					
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**	
	0	0	6	**3**		
Course Objectives	The objectives of this course are to • Understand .NET Framework fundamentals and develop basic applications using VB.NET and C# programming languages. • Implement object-oriented concepts like constructors, interfaces, overloading, and overriding in VB.NET programs. • Utilize advanced data structures such as jagged arrays, array lists, and hash tables in .NET. • Develop database connectivity and web applications using ADO.NET and ASP.NET with practical coding skills.					
Internal Assessment	50 Marks					
External Practical	50 Marks					
Total	100Marks					
Duration of Exam	03 Hours					

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Apply VB.NET and C# programs for calculator, array handling, collections, delegates, events, and database connectivity using ADO.NET.	Level 3: Apply
CO2	Analyze code behavior involving overloading, overriding, jagged arrays, hash tables, and event-driven programming in .NET applications.	Level 4: Analyze
CO3	Evaluate the design and implementation of user interface-driven database connectivity and web form applications in ASP.NET.	Level 5: Evaluate
CO4	Design and build efficient .NET applications integrating GUI, collections, delegates, events, and database connectivity using ADO.NET and ASP.NET.	Level 6: Create

List of Experiments

Sr. No.	Contents
1	Introduction to .NET Framework.
2	Write a program to display message in VB.net using message Box. Write a program to display message in C# using message Box.
3	Write a calculator program in VB.NET.
4	Write a program for constructor in VB.NET. Write a program to implement interface in VB.NET.
5	Write a program to implement overloading. Write a program to implement overriding.
6	Write a program to implement jagged array. Write a program for an array list. Write a program to implement hash table.
7	Write a program to implement multicast Delegates. Write a program to implement multicast Events.
8	Write a program to implement ADO.net Connectivity via user interface.
9	Write a program to demonstrate ado connectivity viva coding in asp.net.
10	Write a program to demonstrate asp.net Web form.
11	Write a program to implement GridView Data Display with ADO.NET in ASP.NET.
12	Write a program to implement HashTable, Stack, Queue.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Client-Side vs. Server-Side Programming	https://www.youtube.com/watch?v=XlryaovT_3k
Unit-II	Inheritance	https://www.youtube.com/watch?v=PaqAhlb5XVw&list=PLLy_2iUCG87Ah844iZW3w3nzWSTA8KSZA&index=14
Unit-III	Using Dataset Objects and Updating Data Binding	https://www.youtube.com/watch?v=meWQLWq7QSE
Unit-IV	State Management, Web Services	https://www.youtube.com/watch?v=Ho2bpbqpkiM

Course Code	**EL-MCA-210A**				
Category	Experiential Learning				
Course Title	**Software Lab-8**				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • To introduce the foundational concepts, history, and applications of Artificial Intelligence. • To develop an understanding of knowledge representation and reasoning techniques. • To explore computational intelligence methods such as genetic algorithms and neural networks. • To study fuzzy logic and neuro-fuzzy systems for decision-making under uncertainty.				
Internal Assessment	50 Marks				
External Practical	50 Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Apply fundamental definitions, concepts, and historical developments of AI, search algorithms, and intelligent systems covered throughout the course.	Level 3: Apply
CO2	Analyze AI techniques like search, reasoning, and learning in solving real-world problems using examples from diverse application domains.	Level 4: Analyze
CO3	Evaluate AI algorithms such as A, DFS, BFS, and game strategies to solve structured and unstructured problem scenarios practically.	Level 5: Evaluate
CO4	Develop AI problem types and compare performance of algorithms for games, puzzles, optimization, and decision-making tasks.	Level 6: Create

List of Experiments

Sr. No.	Contents
1	Write a Program to Implement Breadth First Search using Python.
2	Write a Program to Implement Depth First Search using Python.
3	Write a Program to Implement Tic-Tac-Toe game using Python.
4	Write a Program to Implement 8-Puzzle problem using Python.
5	Write a Program to Implement Water-Jug problem using Python.
6	Write a Program to Implement Travelling Salesman Problem using Python.
7	Write a Program to Implement Tower of Hanoi using Python.
8	Write a Program to Implement Monkey Banana Problem using Python.
9	Write a Program to Implement Alpha-Beta Pruning using Python.
10	Write a Program to Implement 8-Queens Problem using Python.
11	Write a program to implement A* Algorithm using Python
12	Write a function that allows you to generate random problem instances for the knapsack program using Python

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Artificial Intelligence	https://youtu.be/GHpchgLoDvI?si=Yupehj9mqMxeHHaL
Unit-II	Knowledge &Its Representation	https://youtu.be/zT0sGjOSPt8?si=aPh-4h591rWIzgPO
Unit-III	Computational Intelligence	https://youtu.be/XCPZBD9lbVo?si=Cvu36ZDVeM8a1k0S
Unit-IV	Fuzzy Systems	https://youtu.be/K7S3TgfqnX0?si=QZXSnDjodoEJcv3d

Course Code	**RR-MCA-212A**				
Category	Research Report				
Course Title	**Industry Internship Report/ Project Report/Dissertation–II**				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • Develop project planning and management skills for successful technical execution. • Enhance software development, database design, and system integration capabilities. • Apply structured problem-solving methods to resolve complex technical issues. • Improve professional communication skills, both written and verbal. • Understand and apply ethical principles in software engineering practices.				
Assessment	50 Marks				
End Semester Examination	50 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Identify emerging technologies and interdisciplinary fields for hands-on industrial training.	Level 1: Remember
CO2	Demonstrate report writing and presentation skills in technical and industrial contexts.	Level 2: Understand
CO3	Apply engineering principles to analyze and solve real-world industrial problems.	Level 3: Apply
CO4	Analyze ethical standards and tools across diverse technological domains.	Level 4: Analyze
CO5	Evaluate personal performance in communication, teamwork, and technical proficiency.	Level 5: Evaluate
CO6	Design and develop industry-relevant software or hardware systems.	Level 6: Create

Overview:

MCA Dissertation-I is a foundational course that introduces students to the research process in computer science and information technology. This course provides students with the necessary skills and knowledge to undertake independent research projects. Students will learn to identify research problems, conduct literature reviews, design research methodologies, collect and analyze data, and present their findings effectively.

General Guidelines:

Project Selection	Choose a project that is relevant to the field of computer science and information technology. Ensure that the project is feasible and achievable within the given timeframe. Consult with the supervisor to refine the project scope and objectives.
Approval Process	The selected project must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar:

Sr. No.	Parameters	Marks Allotted
1	Clarity of the topic	5
2	Project Planning and Management	5
3	Technical Implementation	10
4	Testing and debugging	10
5	Documentation	10
6	Teamwork and Collaboration	10