About the Department

Computer Science

Computer Science department came into existence in GPGCW, Rohtak on 7th Jan 1994. In its embryonic age, it started with a negligible number of students with only two systems in the absence of any regular computer science lecturer and any supporting lower staff. In session 1994-95 B. Sc (Comp. Sc.) was introduced with 30 seats. Seats in B. Sc increased from 30 to 40 in 2003 and were again increased to 60 in 2006. Our Department introduced a course, APGDCA, in session 2005-06. In session 2008-09, a new course Bachelor of Computer Application (BCA) was introduced with 40 seats. In successive year seats were increased from 40 to 120. In session (2009-10) M.Sc (Comp. Sc.) was introduced with 60 seats. In session (2010-11). Compulsory Basic Computer Education (LEVEL-1) was introduced.
Presently, Computer Science Department is running courses in various Programs:

- BSc Pass with Computer as a Subject
- BCA
- BBA
- PGDCA
- M.Sc (CS)
- B.Com
- B.Com (Hons)
- Physics (Hons)
- Maths (Hons)

The faculty of the computer science department is highly dedicated, motivated, and result-oriented. It can be easily observed that the department has not progressed overnight. The wheels started rolling years ago. The hardworking articulate students are a credit to the department and are great examples of what we hope from our students.

	Name	**Qualifications**

	Dr. SUDESH LATHER HOD	M.A (Maths), M.Sc (CS), M.ED, M.PHIL, Ph.D
	Dr. NISHA MALIK Associate Professor	M.Sc (PHY), M.Sc (CS), Ph.D
	Dr. Suman Ahlawat Assistant Professor	M.Sc (CS), MCA, B.ED, M.A, NET
	Dr. Shalu Rani (Guest Faculty)	MCA, M.Phil, Ph.D
	Ms. Sonia Assistant Professor	M.Tech, NET
	Dr. Subita Assistant Professor	M.Tech, GATE, NET, JRF, Ph.D
	Ms. Monika Rathee Assistant Professor	M.Tech, NET, GATE
	Mr. Joginder Ahlawat Assistant Professor	M.Tech, NET, GATE
	Mr. Chain Singh Assistant Professor	MCA, M.Tech, GATE, NET, HTET
	Ms. Vandana Assistant Professor	B.E, M.Tech, NET, HTET

	Ms. Navita Assistant Professor	M.Tech, NET, GATE, JRF, HTET
	Ms. Lalita Yadav Assistant Professor	MCA, M.Tech, NET
	Dr. Rohini Assistant Professor	Ph.D, M.Tech, M.Sc, NET, GATE, SRF
	Ms. Neetu Assistant Professor	M.Tech, NET, GATE
	Ms. Ritika Extension Lecturer	MCA, NET, HTET
	Dr. Jyoti Extension Lecturer	MCA, NET, GATE, HTET, Ph.D
	Ms. Neha Extension Lecturer	M.Tech, HTET, NET
	Mr. Parmod Extension Lecturer	MCA, NET
	Dr. Suman Extension Lecturer	MCA, JRF, Ph.D

	Dr. Archana Extension Lecturer	B.Tech, M.Tech , NET, JRF, Ph.D
	Dr. Pooja Extension Lecturer	MCA, Ph.D
	Ms. Monika Ahlawat Extension Lecturer	B.E, M.Tech, NET, JRF
	Ms. Teena Extension Lecturer	B.E, MBA, M.Tech
	Mr. Ashish Extension Lecturer	MCA,NET
	Ms. Vaishali (Computer Instructor)	MCA, NET
	Ms. Reenu (Computer Instructor)	MCA
	Mr. Manoj (Computer Attendant)	MCA

Computer Lab

We have a spacious, ventilated and Hi-tech computer lab equipped with all necessary computer terminals. Some features of our lab are:

1. Desktop computers configured with all necessary software

2. Air-conditioned, ventilated atmosphere which protects the systems from overheating.
3. A server room consisting of two servers. The temperature of the room is maintained with the air-conditioners as per requirements.
4. Internet facility is available with connecting LAN & Wi-Fi. CCTV cameras are also installed in the lab for regular monitoring.
5. Laser printers with scanners and inkjet printers are used extensively.
6. A projector used for interactive teaching and learning processes.
7. Web cams used during placement procedures and online registrations
8. Clean and well maintained infrastructure.
9. Regular updating of the systems placed in the lab.
10. A well equipped Smart Class Room.

Computer Science Society

Computer Science Society was formed in Oct 2014. The purpose of forming this is to encourage participation of students in extracurricular activities besides academics.

Scholars of Computer Science Department

Department of Computer Science is known for achieving high academic standards, providing places on merit lists for unseemly results. Department can proudly say that our students are known for their academic excellence and sealing lofty heights in not only their studies but also for their placements in well-known organizations.

Scholars of the Department:-

2016-17

APGDCA 1ST SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
4	3136505	RINKI	

7	**3136503**	**SAVITA**	
9	**3136517**	**KANIKA**	
10	**3136504**	**POOJA CHANNA**	

BCA 2ND SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
48	2018454	SURBHI	

MSC 2ND SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
6	2058141	PRIYANKA SAINI	
16	2058115	KOMAL	
16	2058132	NOORJAHAN KHATOON	

20	2058123	MONIKA	
25	2058120	MANSI	
31	2058147	SAKSHI	
33	2058145	RINKU	
35	2058152	SONIKA	
38	2058130	NISHA	
44	2058146	RITU	
45	2058133	PAYAL	
45	2058136	POONAM	
47	2058104	DIKSHA	
47	2058156	VAISHALI	
50	2058103	BABITA	
50	2058129	NIDHI	

50	2058139	PRIYANKA	

BCA 4TH SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
35	2027391	SUMAN	
47	2027360	PRACHI MITTAL	

BCA 5TH SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
1	7028668	VAIBHAVI KHURANA	
9	7028604	ASHU	
10	7028618	KIRAN	
10	7028649	RAKHI	

11	7028608	BHARTI	
11	7028614	JEENU KUMARI	
11	7028651	RITU	
16	7028629	MENKA	
20	7028669	VARSHA	

BCA 6TH SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
5	2008978	VAIBHAVI KHURANA	
15	2008928	KIRAN	
18	2008939	MENKA	
24	2008959	RAKHI	
26	2008924	JEENU KUMARI	

46	2008979	VARSHA	

2017-18

BCA 1ST SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
4	9006407	RIYA GUPTA	
6	9006411	SANCHI	
7	9006390	PREETY	
16	9006384	POOJA	
17	9006408	RIYA MUNJAL	
46	9006382	PINKI	
47	9006366	MANJU	

BCA 3RD SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
29	9016382	SONIA	
48	9016327	KHUSHBOO	

BCA 5TH SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
46	9025411	SAKSHI	
49	9025388	PRACHI MITTAL	
50	9025375	KOMAL GUPTA	

MSC 1ST SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
19	9505112	ASHU	

20	9505110	PINKI	

MSC 3RD SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
3	9556645	PRIYANKA SAINI	
8	9556638	KOMAL	
9	9556629	SAKSHI	
11	9556641	MONIKA	
17	9556639	NOORJAHAN KHATOON	
18	9556605	PRIYANKA	
20	9556615	RINKU	
24	9556609	MANSI	
25	9556606	PAYAL	

27	9556614	RASHMI	
29	9556607	NIDHI	
33	9556612	NISHA	
34	9556640	DIKSHA RANI	
36	9556628	POONAM	
39	9556619	BABITA	
40	9556622	PRIYANKA	
46	9556604	VAISHALI	
48	9556632	NEELAM	

BCA 2ND SEM

POSITION	**ROLL NO**	**CANDIDATE'S NAME**	**PHOTO**
8	1022691	SANCHI	

19	1022687	RIYA GUPTA	
47	1022670	PREETY	

BCA 4TH SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
42	1035712	SONIA	

MSC 2ND SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
32	1505412	ASHU	

MSC 4TH SEM

S.NO	. ROLL	CANDIDATE'S NAME	
2	1560241	PRIYANKA SAINI	

14	1560215	KOMAL	
15	1560225	MONIKA	
17	1560234	NOORJAHAN KHATOON	
18	1560247	SAKSHI	
23	1560238	PRIYANKA	
36	1560245	RINKU	
37	1560251	SONIKA	
46	1560235	PAYAL	
47	1560220	MANSI	

APGDCA 1ST

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
1	6532708	ANJU	

2	6532705	SUSHAMA	
3	6532711	NIDHI	
4	6532722	POOJA	
5	6532709	REENA	
7	6532721	RENU	
8	6532704	BABITA	
9	6532714	PREETI	
10	6532720	SANEH LATA	
11	6532713	MONIKA	
12	6532716	JYOTI NAGAR	

2018-19

BCA 1ST

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
3	5011880	TEENA	
10	5011871	SONIA	
16	5011886	YOGESH BAI	
38	5011841	QUINCY	
48	5011788	ANNU	

BCA 3RD

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
6	5019433	SANCHI	
19	5019414	PREETY	
20	5019431	SAKSHI	

21	5019417	PRIYANKA	
23	5019429	RIYA GUPTA	
41	5019442	SONIA	
42	5019432	SAKSHI	
46	5019368	CHESHTHA KAPOOR	
48	5019370	DEEPIKA SHARMA	
49	5019398	NEHA	

BCA 5TH

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
20	5029485	SURBHI	
48	5029467	SANJANA RAJPUT	
48	5029477	SHEETAL	

50	5029428	KHUSHBOO	

MSC 1ST

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
1	5500931	NANCY	
11	5500924	ANURADHA	
13	5500936	MANISHA	
16	5500932	SAKSHI	
20	5500926	ARTI	
22	5500906	RINKU	
22	5500945	RITU	
25	5500904	RITU	
26	5500935	RENU	

27	5500929	JYOTI	
35	5500901	RITU	

MSC 3RD SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
14	5502312	ASHU	
23	5502310	PINKI	
43	5502311	PRIYANKA	

BCA 2ND

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
28	8018441	TEENA	
34	8018451	SONIA	

36	8018386	QUINCY	
50	8018429	YOGESH BAI	

BCA 4TH

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
1	8027652	SANCHI	
7	8027613	SAKSHI	
7	8027621	PRIYANKA	
8	8027662	RIYA GUPTA	
28	8027616	DEEPIKA SHARMA	
30	8027695	CHESHTHA KAPOOR	

MSC 2ND

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
5	8502024	ANURADHA	
5	8502031	NANCY	
16	8502036	MANISHA	
17	8502029	JYOTI	
23	8502032	SAKSHI	
29	8502035	RENU	
31	8502006	RINKU	
33	8502045	RITU	
35	8502038	JYOTI KUMARI	
40	8502001	RITU	

MSC 4TH

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
17	8552012	ASHU	
30	8552010	PINKI	

2019-20

BCA 6TH SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
1	9414442	SANCHI	
7	9414438	RIYA GUPTA	
8	9414426	PRIYANKA	
12	9414440	SAKSHI	
45	9414423	PREETY	
50	9414377	CHESHTHA KAPOOR	

MSC 4TH SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
2	9376401	NANCY	
10	9376385	ANURADHA	
20	9376389	JYOTI	
28	9376418	SAKSHI	
31	9376395	MANISHA	
31	9376416	RITU	
33	9376386	ARTI	
34	9376411	RENU	
36	9376413	RITU	
42	9376412	RINKU	
47	9376408	PREETI	

APGDCA 2ND SEM

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
1	8300451	NITIKA	
3	8300453	POOJA	
4	8300456	PRIYANKA	
5	8300447	MANISHA RATHEE	
7	8300441	ANJU	
12	8300448	MANJU RANI	
13	8300454	POONAM	
14	8300452	PARVEEN KUMARI	

2020-21

BCA 2ND

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
37	9395389	TAMANNA	
39	9395388	TAMANNA	
49	9395308	GARIMA	
49	9395387	SWATI SHARMA	

MSC 2ND

POSITION	ROLL NO	CANDIDATE'S NAME	PHOTO
8	9364089	PRIYANKA	
9	9364103	YASHIKA	
11	9364090	RAVINA	
12	9364094	SANJU	
15	9364105	YOGITA	

30	9364087	PRIYANKA	
36	9364097	SIKHA	
38	9364095	SHABNAM	
40	9364072	KIRTI DEVI	
47	9364079	NIKITA	

Department of Computer Science

Programme Specific Outcomes

The students upon completion of **B.Sc. with Computer Science as a Subject Programme** will be able to:

- PSO1: Ability to communicate computer science concepts, data structures, programming Languages, databases, computer hardware etc.
- PSO2: Apply problem solving skills and the knowledge of computer science to solve real World problems
- PSO3: Holistic development of students with the inculcation of moral and social values to help them become better citizens of India
- PSO4: Innovative practices would be utilized to bridge the gap between business leaders and computer industry experts.
- PSO5: Students would be able to use mathematics through differential and integral calculus, Numerical analysis, probability and statistics and its applicability to computer science and engineering

Department of Computer Science

Programme Specific Outcomes

The students upon completion of **BCA (Bachelor of Computer Application) Programme** will be able to:

- PSO1: Improve their computer literacy, their basic understanding of operative systems and gain a working knowledge of software commonly used in academic and professional environments.
- PSO2: Develop the skills to present ideas with the latest technology, tools and applications in IT in order to meet the ever-growing requirement of IT professionals
- PSO3: Demonstrate the ability to identify the business problems, analyze and access various issues, set appropriate criteria for decision making and draw appropriate conclusions
- PSO4: Exhibit communication and management skills, especially in providing technical support and develop IT oriented security issues and protocols.
- PSO5: Blend proficiency in mathematics used in computer science, differentiate between various data structures used in programming language.
- PSO6: Gain the knowledge of computer programs by using functional programming object oriented programming paradigms, apply techniques of software validations and reliability to computer programs
- PSO7: Serve as system administrators with through knowledge of DBMS, work as hardware designers and engineers with the knowledge of networking concepts.
- PSO8: Demonstrate critical thinking and communication skills, which help in expressing ideas effectively.
- PSO9: Develop interdisciplinary approach among the students
- PSO10: Acquire knowledge of algorithms and the role they play in developing programming techniques and computer science.
- PSO11: Preparing students for various roles to IT industry like web designer, system analyst, software developer and network administrator etc.
- PSO12: Focusing on developing programming skills, networking skills and learning latest techniques of computer science
- PSO13: Developing ability to use research, experiment to resolve industrial problems
- PSO14: Developing ability to demonstrate team work with the quality leadership and analytical reasoning for solving various critical problems
- PSO15: The students will be able to design, implement knowledge for computer programme
- PSO16: This course will develop human values and professional ethics in the social, moral, spiritual and legal aspects of computing techniques

Department of Computer Science

Programme Specific Outcomes

The students upon completion of **APGDCA (ADVANCE POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS) Programme** will be able to:

- PSO1: It will equip the students with skills required for designing, developing applications in Information Technology.
- PSO2: Students will able to learn the latest trends in various subjects of computers &information technology.
- PSO3: The PG Diploma is aimed at graduates with a computing background and provides a detailed coverage of the key concepts and challenges in data and resource protection and computer software security.
- PSO4: To give hands on to students while developing real life IT application as part of the study.
- PSO5: To train graduate students in basic computer technology concepts and information technology applications.
- PSO6: Design and develop applications to analyze and solve all computer science related problems.
- PSO7: To expose the students to open Source technologies so that they become familiar with it and can seek appropriate opportunity in trade and industry.
- PSO8: Able to provide socially acceptable technical solutions to real world problems with the application of modern and appropriate programming techniques.
- PSO9: Design applications for any desired needs with appropriate considerations for any specific need on societal and industrial aspects.

Department of Computer Science

Programme Specific Outcomes

The students upon completion of **M.Sc. (Computer Science) Programme** will be able:

- PSO1: To possess practical and theoretical knowledge of computer science and software development sufficient to earn a living and contribute to the economic development of the region, state and nation.
- PSO2: To Understand and analyse a given real-world problem and propose feasible computing solutions.
- PSO3: To Analyze customer requirements, create high level design, implement and document robust and reliable software systems
- PSO4: To Use the techniques, skills and modern hardware and software tools necessary for innovative software solutions and to recognize the social, professional, cultural and ethical issues involved in the use of computer technology and give them due consideration in developing software systems.
- PSO5: To be prepared for higher education in computer science and related areas, and pursue research in relevant areas of computer science.
- PSO6: To Understand and respect the professional standards of ethics expected of computer scientists and software engineers and appreciate the social impact of computing.
- PSO7: To recognize the importance of and possess the skills necessary for life-long learning in the area.
- PSO8: To Work collaboratively as a member or leader in multidisciplinary teams and be able to select teaching/software engineer as their career after acquiring necessary eligibility requirement.

Department of Computer Science

Course Outcomes for B.Sc. with Computer Science as a Subject

Course code	Title	Course Objectives
1.1	Computer Fundamentals & MS-Office	1. CO1: Know the basics of computer system, number systems, inter conversion of numbers, coding systems, computer codes 2. CO2: Understand the different type of input/output devices, memory systems and video standards 3. CO3: Be familiar with software, its types and logic development tools-algorithm, flowcharts 116 4. CO4: Get practical learning of MS-Word, Excel and PowerPoint in office automation tools 5. CO5: Differentiate various types of hardware and software and areas of applications
1.2	Computer Architecture	1. CO1: Learn about basic building blocks and circuit design 2. CO2: Understand arithmetic circuits and combinational circuits 3. CO3: Know about sequential circuits 4. CO4: Familiarize with register transfer and micro-operations 5. CO5: Know about the computer organization and design.
1.3	Practical Lab Work (Computer Fundamentals and MS-Office)	1. CO1: Create MS-Word documents, designing these documents with bullets, numbering and other Word Art options in MS-Word 2. CO2: Design MS-Excel sheets using different styles of tables, charts, formulas, functions like mathematical and logical 3. CO3: Create PowerPoint slides using single and multiple slides, animation and sound effects in it 4. CO4: Design a file using different tools of MS-Office completely
2.1	Programming in 'C'	1. CO1: Understand the basic concepts of programming and development of efficient programs 2. CO2: Understand the concept of various data types, symbols, words, operators and expressions used in language 3. CO3: Learn about decision making, branching and looping statements 4. CO4: Understand the concept of built-in functions, user defined functions and

		different techniques used 5. CO5: Differentiate between arrays and pointers, know about string handling 6. CO6: Learn about derived data types and file handling
2.2	Structured Systems Analysis and Design	1. CO1: Learn characteristics of system and its types 117 2. CO2: Understand structure analysis and its tools 3. CO3: Know about the feasibility study and cost-benefit analysis 4. CO4: Understand system design and form design methodology 5. CO5: Learn the concept of system testing and quality assurance goals 6. CO6: Understand system implementation, evaluation, maintenance and documentation
2.3	Practical & Viva-voce (Based on Paper 1.1 & 2.1)	1. CO1: Implement the basic concept of C language 2. CO2: Implement the different operator in C program 3. CO3: Implement the various Constructs using C language 4. CO4: Create programs using Arrays, Pointers and String operations in C language 5. CO5: Implement different file handling functions in C programs
3.1	Data Communication and Networking	1. CO1: Understand the basic concept of networking, network topologies and OSI and TCP/IP model 2. CO2: Understand analog and digital communication data transmission and its types. Knowledge of transmission media, switching and multiplexing concepts 3. CO3: Describe communication satellite, dialup networking and analog modem concept 4. CO4: Learn about data link layer responsibilities and their implementation like media access control protocol 5. CO5: Understand the concept datagram, and virtual circuit Routing algorithm and its types and inter networking 6. CO6: Learn about the elements of transport layer. Understand the different protocols like internet transport protocol, UDP, real time transport protocol also learn about application layer, domain name system, E-mail, www
3.2	Object-Oriented	1. CO1: Learn about object oriented concept

	Design and C++	and object modeling technique 2. CO2: Learn about syntax, structure and concepts of C++ data types and classes and objects and also explain data member and member function 3. CO3: Implement the concept of constructer and destructor. Explain dynamic memory allocation console I/O formatted and unformatted I/O 4. CO4: Understand the concept of inheritance and polymorphism and classify the difference between overloading and overriding 118 5. CO5: Understand the concept of virtual function and virtual class
3.3	Practical Lab Work	1. CO1: Implement the basic concepts like creation of Class, Objects, Member functions 2. CO2: Implement concepts like Static data members, Inline functions, Function overloading, Friend functions, etc. 3. CO3: Create the program implementing the concepts of Construction, Destructors and this Pointer 4. CO4: Implement the concepts of Formatted and unformatted Input/output functions 5. CO5: Create the program implementing the concepts of Inheritance and Polymorphism
4.1	Data Structures with C/C++	1. CO1: Understand data structure and its essence 2. CO2: Learn the array operations 3. CO3: Implement stack and queue 4. CO4: Understand linked list and tree structures and their applications 5. CO5: Learn graph data structure and its implementation 6. CO6: Implement various sorting and searching algorithms
4.2	Operating Systems	1. CO1: Understand about different types of operating system 2. CO2: Know about process scheduling and algorithm of scheduling. Deadlock prevention and avoidance concept also be cleared by the students 3. CO3: Describe different memory management technique 4. CO4: Know about the file management concept and its classification and also be familiar with directory structure and file protection mechanism
4.3	Practical & Viva-	1. CO1: Implement the various operations

	voce (Based on Paper - 3.2 & 4.1)	applied on array 2. CO2: Create the program implementing various types of searching and sorting 3. CO3: Implement the program having stack operations 4. CO4: Create the program implementing various Queue operations 119 5. CO5: Implement various operations of Linked-List
5.1	Database Management System	1. CO1: Understand the concepts of file based approach and database approach 2. CO2: Describe the database system architecture and various data models 3. CO3: Describe the entity-relationship model, conceptual design using E-R diagram 4. CO4: Define and describe the various normal forms of normalization and various types of dependencies applicable on various normal forms 5. CO5: Define, describe and implement the various SQL queries
5.2	Introduction to Internet & Web Technologies	1. CO1: Understand internet, internet protocols and internet tools 2. CO2: Learn about internet security problems and solutions 3. CO3: Know about search engines and how to surf the net 4. CO4: Create and publish a web page via HTML language using text formatting font controls and list 5. CO5: Implement hyperlink on web page 6. CO6: Understand how to create table and implement graphics in HTML programs
5.3	Practical Lab Work (Based on paper 5.1 & 5.2)	1. CO1: Implement interactive web page(s) using HTML 2. CO2: Design a responsive web pages via using FORMs 3. CO3: Create a real life application with constraints and keys using SQL 4. CO4: Retrieve any type of information from a database by formulating queries in SQL
6.1	Visual Basic Programming	1. CO1: Understand the overview of programming languages (Visual and Non-Visual) 2. CO2: Understand VB application environment and event driven programming 3. CO3: Implement selective structures and repetitive structures in VB program using different control statements 4. CO4: Develop program using procedures,

		subroutines and functions 120 5. CO5: Develop database programs using DAO and ADO
6.2	Software Engineering	1. CO1: Describe various software life cycle models and goals and principles of software engineering 2. CO2: Understand various software requirement analysis techniques 3. CO3: Describe the various components of SRS document and their relevance 4. CO4: Be familiar with various software project management and configuration management techniques 5. CO5: Know about the various software design types and principles
6.3	Practical & Viva-Voce(Based on 5.1, 5.2& 6.1)	1. CO1: Demonstrate knowledge of programming terminology and how applied using Visual Basic (e.g., variables, selection statements, repetition statements, etc.) 2. CO2: Develop a Graphical User Interface (GUI) based on problem description 3. CO3: Develop and debug applications using Visual Basic that runs under Windows operating system 4. CO4: Develop programs that retrieve input from a file as real life application via using FORMs and Database controls

Department of Computer Science

Course Outcomes for BCA

At the end of the BCA Programme, students will be able to:

Course Code	Title	Course Objectives
BCA-101	Computer Programming & Fundamentals	1. CO1: Identify the components of computer and assemble the parts of computer 2. CO2: Work in different OS environments and to classify various types of viruses and antivirus software 3. CO3: Classify develop logics for the solution of programmes 4. CO4: Classify and describe various types of networks 5. CO5: Understand various elementary concepts of computer
BCA-102	PC Software	1. CO1: Understand the concept of operating system, its types and their features practically 2. CO2: Get practical learning on MS-Word and its general and advanced features 3. CO3: Get practical learning on MS-Excel, its different features as worksheet, database management and chart creation 4. CO4: Get technical learning on PowerPoint presentations using different features as animation, graphic effects, sound effects, time effects and layering objects 5. CO5: Acquaint themselves with office automation software and their use according to application areas
BCA-103	Mathematics	1. CO1: Know the basics of set theory and its applications 2. CO2: Understand the concept of matrices and determinants 3. CO3: Learn about relations and its properties 4. CO4: Study different types of functions 5. CO5: Know about limits and continuity and how to compute them 6. CO6: Understand the differentiation and to find the derivations of different types of functions 7. CO7: Learn about integrals, their properties and how to evaluate them
(BCA-104)	Logical Organization of Computer-I	1. CO1: Learn about number system including binary arithmetic 2. CO2: Know about character codes and their representations and how to detect and correct errors 172 3. CO3: Explain Boolean Algebra and know how

		to simplify the Boolean functions via K-map 4. CO4: Implement basic and universal gates in circuits and also know the use of gates in multilevel NAND and NOR circuits 5. CO5: Understand combinational circuits and their application areas 6. CO6: Familiarize with addressing modes
BCA-105	Practical Software Lab	1. CO1: Create MS-Word documents, designing these document with bullets, numbering and other Word Art options in MS-Word 2. CO2: Design MS-Excel sheets using different styles of tables, charts, formulas, functions (Mathematics, Logical) 3. CO3: Create PowerPoint slides using single and multiple slides, animation and sound effects in it 4. CO4: Design a file using tools of MS-Office completely
BCA-106	'C' Programming	1. CO1: Understand the different types of symbols, words, syntax, structure and concepts of 'C' language 2. CO2: Learn about decision making, branching and looping statement and their implementation 3. CO3: Implement built-in functions, user defined functions and different programming techniques of 'C' language 4. CO4: Get practical learning of arrays, pointers, storage classes 5. CO5: Design/develop algorithms, flow charts to help development of efficient programmes
BCA-107	Logical Organization of Computer-II	1. CO1: Understand the concept of sequential circuits 2. CO2: Design the register and counters via flip flop 3. CO3: Know about the memory and I/O devices 4. CO4: Know the role of instructions in computer architecture their cycle, set selection and format 5. CO5: Lay emphasis on the importance of interrupt structure
BCA-108	Mathematical Foundations of Computer Science	1. CO1: Understand about the measures of central tendency and measures of dispersion 2. CO2: Get familiar with algorithms, merits and demerits 3. CO3: Understand graphs, sub graphs, connected and disconnected graphs 4. CO4: Differentiate between Eulerian and Hamiltonian graphs 5. CO5: Learn to apply tree and graph algorithms to solve problem 6. CO6: Learn about Recursion and Recurrence

		relation 7. CO7: Know about PMI, GCD and Fibonacci nos. 8. CO8: Understand congruences and equivalence relations
BCA-109	Structured Systems Analysis and Design	1. CO1: Learn about system, SDLC, system planning and initial investigation, fact-finding and its techniques 2. CO2: Define - structured analysis, its tools, feasibility study in detail and also learn about cost and benefit analysis with its final action 3. CO3: Understand about system design, design methodologies, Input/output and form design with their classification, requirements, objectives, types and layout considerations 4. CO4: Know about system testing, testing techniques, test plan and also understand about the system implementation, evaluation and maintenance with their types
BCA-110	Practical-Software lab Based on paper BCA-106, C Programming	1. CO1: Implement the basic functions using 'C' 2. CO2: Understand the concept of operators 3. CO3: Analyze and understand different constructs in 'C' 4. CO4: Define various formatted/unformatted I/O functions using 'C' 5. CO5: Differentiate between the concepts of arrays and string
BCA-201	Introduction to Operating System	1. CO1: Understand the need of operating system and define types of operating systems 2. CO2: Describe and define process, threads and interposes communication 174 3. CO3: Evaluate and analyze various scheduling algorithms, identify deadlocks and describe the methods of handling deadlocks 4. CO4: Know and differentiate between physical and logical address, define swapping and various memory allocation technique, understand the concept of virtual memory and thrashing 5. CO5: Understand file management, structure and allocation method 6. CO6: Define and describe various disk scheduling algorithms
BCA – 202	Data Structures-I	1. CO1: Understand the basic concepts of data structure like types, operations, applications, etc. 2. CO2: Acquire knowledge about how to describe and implement arrays and linked list 3. CO3: Define, describe and implement stack and queue

		4. CO4: Understand the concepts related to tree and graphs
BCA – 203	Introduction to Database System	1. CO1: Know about the basic concepts of database and also define various functions, components, advantages and disadvantages of DBMS 2. CO2: Learn about database system architecture, data independence and data models 3. CO3: Know about E-R model with practice of daily practical examples, relational data structures, database relations and its properties 4. CO4: Give the knowledge about relational algebra and relational calculus, and various normal forms of normalization technique in database 5. CO5: Give practical approach of basic commands of SQL, the query processing and query optimization
BCA-204	Communication Skills (English)	1. CO1: Demonstrate critical and innovative thinking on various issues 2. CO2: Display competence in written and oral communication 3. CO3: Apply communication theories and learn efficiency in language expression 4. CO4: Respond effectively to cultural communication differences 5. CO5: Demonstrate positive group communication exchanges
BCA-205	Practical Software Lab Practical based on Paper BCA-202 & 203 Using C Language and SQL	1. CO1: Implement the various operations on string and arrays 2. CO2: Understand the concept of Recursion 3. CO3: Implement the operations of stock, queue and link list 4. CO4: Analyze and implement DDL and DML, DCL Commands 5. CO5: Implement constraints on tables with different types of key link (Primary, Unique and Not Null)
BCA – 206	Web Designing	1. CO1: Learn Web designing basic terms like web browser, web server, http, TCP/IP and search engine and also understand how these terms are used 2. CO2: Learn about the basic steps to create website, and add image, picture, link, background, etc. 3. CO3: Understand the language HTML, how HTML language tags are used, and how these tags are helpful in making website 4. CO4: Define HTML list, table and forms, the forms with menu working radio button, check

		box, text box, etc. 5. CO5: Describe basic knowledge of DHTML JSSS and CSSP
BCA – 207	Data Structure-II	1. CO1: Understand the concept of trees and various types of trees 2. CO2: Learn to identify shortest path for Warshall's and Dijkstra algorithm 3. CO3: Implement various sorting and searching algorithms 4. CO4: Classify various physical storage devices and files 5. CO5: Learn Hashing functions and collision resolution methods
BCA-208	Object Oriented Programming Using C++	1. CO1: Differentiate between procedural oriented programming and object oriented programming 2. CO2: Learn about syntax, structure and concepts of C++ 176 3. CO3: Implement the concept of various access specified in programmes and describe the various operators used in the language 4. CO4: Understand the concept of inheritance and polymorphism and classify the difference between overloading and overriding 5. CO5: Understand the concept of exception handling and use of templates
BCA-209	Software Engineering	1. CO1: Identify the various components of SRS document and their relevance 2. CO2: Describe the software project management and classify the various project planning techniques 3. CO3: Describe the various metrics related to each phase of software development life cycle 4. CO4: Understand the relationship between software design and software implementation 5. CO5: Describe the various software testing techniques 6. CO6: Write down the classification of various software maintenance methods and issues
BCA-210	Practical Software Lab Practical based on Paper BCA-206 & 208 Using HTML & C++ Language	1. CO1: Implement the concept of object oriented programming using C++ 2. CO2: Understand the implementation of the concept of polymorphism and inheritance 3. CO3: Understand the concept of exception handling and templates for implementation 4. CO4: Implement interactive Webpage(s) using HTML 5. CO5: Design a responsive webpage using FORMS
BCA – 301	Management Information	1. CO1: Describe system and its basic concepts and information system in detail

	Sytem	2. CO2: Describe MIS, levels of Management, Simon's Model of decision making 3. CO3: Learn and describe developing information system and pitfalls in MIS development 4. CO4: Learn and describe Functional MIS that includes Personnel, Financial and production MIS, decision support system
BCA-302	Computer Graphics	1. CO1: Describe graphic system, application area of graphics, define various input output devices and differentiate between raster scan and random scan 2. CO2: Define various scan conversation of point, line, circle and ellipse, filled area primitives 3. CO3: Evaluate and define and evaluate 2d transformation, viewing pipeline and clipping algorithms 4. CO4: Define and evaluate 3d transformation, viewing pipeline and clipping algorithm
BCA – 303	Data Communication and Networking	1. CO1: Understand the basic concepts like computer network topologies, design issues and protocols like X25, Frame relay, ATM etc. 2. CO2: Describe the various communications and networking models like OSI, TCP/IP, etc. 3. CO3: Understand the various concepts of analog and digital communications that includes representation, data encoding techniques, etc. 4. CO4: Describe various modulation techniques, types of transmission media and various switching and multiplexing techniques 5. CO5: Learn about data link layer responsibilities and their implementation like media access control protocols, various LAN technologies and various network hardware components 6. CO6: Describe various network layer and routing concepts, and various network security methods
BCA – 304	Visual Basic	1. CO1: Understand the overview of programming language (visual and non-visual) 2. CO2: Understand VB application environment and event driven programming 3. CO3: Learn about basic programming concepts like variables, operators and various control for I/O in VB 4. CO4: Implement various control constructs, arrays and collections used in VB 5. CO5: Learn and implement about procedure, subroutine and menu driven programming 6. CO6: Get practical learning on Visual Basic

BCA-305	Practical Software Lab Practical based on Paper BCA-304 (VB Language and BCA-302)	1. CO1: Implement line drawing algorithms 2. CO2: Create images using basic functions 3. CO3: Develop a Graphical User Interface (GUI) based on problem description 4. CO4: Develop and debug applications using VB that runs under operating system
BCA – 306	E-Commerce	1. CO1: Know the concepts of E-Commerce and their usage in daily life 2. CO2: Know the use of E-payment system other e- techniques and security mechanism 3. CO3: Know the difference between traditional and modern e-payment system 4. CO4: Know the practical usage of e-payment apps CO5: Familiarize with EDI technology and its working CO6: Learn about the concept of EDI standards, EDI implementation, EDI agreement and EDI security
BCA-307	Object Technologies & Programming using Java	1. CO1: Differentiate between procedure and object oriented programming 2. CO2: Describe how object oriented methodologies are used in Java 3. CO3: Understand why Java is called platform independent language 4. CO4: Define and implement concept of inheritance and polymorphism 5. CO5: Define and implement the concept of package, interface and exception handling 6. CO6: Differentiate between string and string builder class. Learn about multi- threading and I/O in Java
BCA-308 Artificial Intelligence	Artificial Intelligence	1. CO1: Understand and describe the concept of problem space and search 2. CO2: Learn about various heuristic search techniques 3. CO3: Evaluate and analyse various techniques and issues in knowledge representation 4. CO4: Understand the various natural language processing concepts and various learning methods 5. CO5: Describe the various components of an expert system and about expert system shells
BCA – 309	Introduction to .NET	1. CO1: Learn about framework, features and architecture of .Net 2. CO2: Define the namespace, types and objects in .Net and learn about the evaluation of web development 3. CO3: Describe class libraries and define .net assemblies, meta data and attributes and learn about characteristics of C# and different types

		of variables and scope of variables 4. CO4: Understand and implement operators and expressions used in C# and implement various control constructs used in C# 5. CO5: Define classes and methods with the help of C# programming and implement the concept of constructor, destructor and overloading of operators and functions 6. CO6: Learn and implement concept of inheritance, polymorphism, exception handling and learn about input/output streams used in C# 7. CO7: Get practical learning on .Net programs
BCA-310	Practical Software Lab – Based on paper BCA-307 and BCA-309	1. CO1: Implement the basic concept like Data types variables, constants, default values, boxing and unboxing with the help of Java and .Net 2. CO2: Create the program implementing the concept of operators and expressions in Java and .Net 3. CO3: Implement the concepts of object oriented programming in Java and .Net 4. CO4: Implement inheritance and polymorphism in Java and .Net

Department of Computer Science

Course Outcomes for APGDCA

At the end of the **APGDCA (Advance Post Graduate Diploma in Computer Applications)** Programme, students will be able to:

Course Code	Title	Course Outcomes
APGDCA-101	Foundation Course in IT And MS-Office -2000	• CO1:Give students an in-depth understanding of why computers are essential components in business, education and society. • CO2:Provides hands-on use of Microsoft Office applications Word, Excel and PowerPoint. Completion of the assignments will result in MS Office applications knowledge and skills. • CO3:Understand the basic terminology of computers • CO4:Understand the practical concepts of MS Word, MS Excel, MS PowerPoint, and MS Access • CO5: To make familiar with the part and function of computer , its types , how to use computer in our day to day life , its characteristics, its usage , Limitations and benefits etc. • CO6: To introduce students with basic concepts of Operating System, its functions and services. • CO7: Making the students understand and learn the basics of computer how to operate it. • CO8: To make familiar with the part and function of computer, its types , how to use computer in our day to day life , its characteristics, its usage , Limitations and benefits etc. • CO9: Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components • CO10: Understand the difference between an operating system and an application program, and what each is used for in a computer technology has had on some common products • CO11: Use systems development, word-processing, spread sheet, and presentation software to solve basic information systems problems.
APGDCA-102	Computer Networking & Multimedia	• CO1: Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model. • • CO2: Gain core knowledge of Network layer routing protocols and IP addressing. • CO3: Study the cell structure and various layers of ATM. • CO4: Knowledge about various classes of IP

		Addressing • CO5: Study of Data Compression Techniques • CO6: Study about Cryptography, Creating, renaming, deleting, disabling user account in Windows NT • CO7: Knowledge about Multimedia Technologies. Digital representation of sound and transmission. • CO8: Knowledge about digital video and image compression • CO9: Knowledge about Audio Compression and Decompression, Audio Synthesis, MIDI, Speech Recognition & Synthesis, Video Capturing, Compression & Decompression, Real-time 3D, LANs and Multimedia. • CO10: Virtual environment displays and orientation tracking; visually coupled system requirements; intelligent VR software systems.
APGDCA-103	Programming in C and Data Structure	• CO1: Understand the fundamentals of C programming. • CO2: Students will acquire knowledge and skills of programming. • CO3: Students will be able to develop logics which will help them to create programs, applications in C. • CO4: Also by learning the basic programming constructs they can easily switch over to any other language in future. • CO5: Knowledge about Time and Space complexity of algorithms • CO6: Knowledge about various Data structures like Arrays, Stacks, Queues, Linked Lists, Trees and Graphs. • CO7: Knowledge about concepts of fields, records and files. Sequential file organisation, ISAM, Hashing techniques, Inverted Lists and Multilists. • CO8: Knowledge about: Internal and External sorting. Searching techniques and merging algorithms.
APGDCA-104	Computer Organization And Architecture	• CO1: Study about Number Systems, Integer and Floating-point representation, Character codes – ASCII and EBCDIC. • CO2: Knowledge about Logic gates, Boolean Algebra, flip flops, memory, Register transfer and Micro-operations etc. • CO3: knowledge about Basic Computer Organization and Design. • CO4: Knowledge about Programming the Basic Computer like assembly Language. • CO5: Deep knowledge of Central Processing Unit. • CO6: Study of Basic computer Arithmetic. • CO7: Complete knowledge of Input-Output Organization:
A PGDCA	Practical	• CO1: Students will be familiar with some advanced

105	I(Based on APGDCA-101 & 103)	Office functions, including Mail Merge (Word) and formulas (Excel). • CO2: Students will understand how to use Word, Excel, and PowerPoint in a variety of professional, educational, and personal situations. • CO3: Students will be able to claim Office proficiency. • CO4: Students will be able to Read, understand and trace the execution of programs written in C language. • CO5: Write the C code for a given algorithm. • CO6: Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor. • CO7: Write programs that perform operations using derived data types
APGDCA-201	Visual C++	• CO1: Building a Basic Application using VC ++ • CO2: Learn about Visual C++ Resources: • CO3: learn about Window Controls and Dialog Box: • CO4: Learn about Advance Window Controls: Toolbars up down controls, Spin control, Progress bar, Tree view, Tab controls, Tool tip, slider control, image list control. • CO5: Working with Graphics, Consoles, Multitasking Process and Threads. Clipboard Drag and Drops, Advance features of Windows Programming GDI Metafiles, Sound API and DLL.
A PGDCA - 202	Visual Basic & Oracle	• CO1: Knowledge of VB concepts, Simple Active X controls, s, Database Programming, Crystal Reports. • CO2: Learn about Oracle, RDBMS, SQLPLUS, Data types, Data Constraints, Operators, Data manipulation • CO3: Learn about SQL*Forms, PL/SQL Blocks in SQL*Form, SQL*Report Writer and SQL*Menu. • CO4: Knowledge of Database Triggers • CO5: Utilities, Export/Import, SQL*Loader.
A PGDCA - 203	System Analysis & Design	• CO1: Knowledge of Elements of system, Types of system, system development life cycle, project selection, feasibility, analysis, design, implementation, testing and evaluation. • CO2: Able to project development. • CO3: Efficient in System requirement specification and Analysis and System Design. • CO4: Efficient in System Testing, implementation, System evaluation, System maintenance and its types, System documentation, Forms of documentation.
APGDCA-204	Practical-II (Based on APGDCA-201& 202)	• CO1: Students code visual programs by using Visual Basic and Visual C++ work environment. • CO2: Distinguish and compose events and methods. • CO3: Recognize and arrange control structures. • CO4: Design a complete program using visual programming or Visual C++ concepts.

		• CO5: Students prepare various projects by helping visual programming and Visual C++. • CO6: Manage and analyse prepared project with programs. Interpret and report obtaining results. • CO7: Create flowcharts for simple programming problems. • CO8: Develop algorithms for simple programming problems. • CO9: Write pseudo-code as solutions to programming problems. • CO10: Demonstrate proficiency in writing structured programs using the Visual C++ programming language to resolve problems.
APGDCA-205	Project Work, Report & Viva-Voce (Based on any Language, Software Development Tool, etc.)	• CO1: Provides technology-oriented students with the knowledge and ability to develop creative solutions. • CO2: Develop skills to learn new technology. • CO3: Apply computer science theory and software development concepts to construct computing-based solutions. • CO4: Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, Artificial Intelligence, Mobile applications. • CO5: Students will acquire the skills to communicate effectively and to present ideas clearly and coherently to specific audience in both the written and oral forms. • CO6: Students will be able to learn on their own, reflect on their learning and take appropriate actions to improve it.

Department of Computer Science

Course Outcomes for M.Sc.

Course Code	Title	Course Objective
16MCS21C1	Discrete Mathematics	1. CO1: Identify and apply basic concepts of set theory, arithmetic, logic, proof techniques, binary relations, graphs and trees 2. CO2: Write an argument using logical notation and discriminate between valid and invalid arguments. 3. CO3: Demonstrate an understanding of relations and functions and be able to determine their properties and able to determine when a function is one to one, onto, many to many and so on. 4. CO4: Identify different types of matrices and able add, subtract, multiply matrices. Also able to calculate determinant, minors and cofactors of the matrices. 5. CO5: Identify different types of grammars used in automata and able to convert NFA to DFA and mealy to more machines.
6MCS21C2	Computer Fundamentals and Programming in C	1. CO1: Understand the Computer fundamentals. 2. CO2: Use of various problem solving techniques. 3. CO3: Understand the C programming fundamentals. 4. CO4: Understand C by using arrays, functions, structures and union. 5. CO5: Develop the Programs in C using its advance features.
16MCS21C3	Database Management System	1. CO1: Understand the database concepts and structures. 2. CO2: Understand data modeling and database development process. 3. CO3: Construct and normalize conceptual data models. Implement a relational database into a database management system. 4. CO4: Use database management systems (Oracle SQL Plus). 5. CO5: Become proficient in using database query language (SQL)
16MCS21C4	Computer Organization and Architecture	1. CO1: Design a circuit for any digital function 2. CO2: Use K-map for simplification of Boolean expressions 3. CO3: Identify the addressing modes of instructions and calculation of effective

		address 4. CO4: Determine which hardware blocks and control lines are used for different instructions 5. CO5: Classify the parallel processors.
16MCS21CL	Practical-I Based on 16MCS21C2 & 16MCS21C3	1. CO1: Knowledge of Basic fundamentals and their implementation syntax of programming. 2. CO2: Able to develop basic programs of in c language and Use various problem solving techniques. 3. CO3: Able to implement arrays in C Programming. 4. CO4: Programming in C by using functions, structures and union. 5. CO5: Able to solve various problems using C language on small scale.
16MCS22C1	Data Structure using C	1. CO1: Knowledge of programming fundamentals including structured and efficient programming. 2. CO2: Use various problem solving techniques using C. 3. CO3: Knowledge of stacks, queues, recursion and linked lists and their implementation in C. 4. CO4: Knowledge of trees and file structures. 5. CO5: Knowledge and Development of Programs in C for searching and sorting techniques.
16MCS22C2	Object Oriented Programming using C++	1. CO1: Use the characteristics of an object-oriented programming language in a program. 2. CO2: Use the basic object-oriented design principles in computer problem solving. 3. CO3: Apply C++ features to program design and implementation. 4. CO4: Design and implementation programs of Constructor, Destructor, and Inheritance. 5. CO5: Design and implementation programs of Polymorphism, Exception handling, Templates and Working with files.
16MCS22C3	Software Engineering	1. CO1: Analyze and resolve software crisis issues by using systematic and scientific approaches in the development of software system. 2. CO2: Aiming to develop the software system with low cost, high quality and within the given timeframe. 3. CO3: Use a variety of scripting tools and languages to automate routine tasks such as

		analysis, design, coding and testing tasks, security issues to the implementation of software systems. 4. CO4: Install, configure, troubleshoot, maintain, and upgrade software components. 5. CO5: Provide efficient and effective technical support to clients in a manner that promotes safe computing practices and reduces the software risks.
16MCS22C4	Computer Networks	1. CO1: Independently understand basic computer network technology. 2. CO2: Understand and explain Data Communications System and its components, different types of network topologies and protocols. 3. CO3: Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer, different types of network devices and their functions within a network. 4. CO4: Understand and building the skills of sub-netting and routing mechanisms. 5. CO5: Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
16MCS22CL	Practical-II Based on Paper 16MCS22C1 & 16MCS22C2	1. CO1: Demonstrate use of copy constructor and class member functions with suitable example. 2. CO2: Elaborate on inheritance and virtual functions with suitable example. 3. CO3: Learn how to use basic principles of Exception Handling with Multiple Catch in programs. 4. CO4: Elaborate on Virtual Base Class in application with suitable example. 5. CO5: Demonstrate on Function Overloading with suitable example.
17MCS23DA1	Compiler Design	1. CO1: To deal with different translators 2. CO2: To use the knowledge of patterns, tokens & regular expressions for solving a problem. 3. CO3: Representation of expressions in the form of symbol table, parse tree, three address code, quadruple, triples etc. 4. CO4: To learn the new code optimization techniques to improve the performance of a program in terms of speed & space. 5. CO5: To acquire the knowledge of modern compiler & its features.
17MCS23DA2	Computer Security	1. CO1: Apply security measures to commonly

		used computer resources 2. CO2 Identify the possible threats and apply protection mechanisms 3. CO3 Classify sensitive data and its relevance 4. CO4 Identify malicious and non-malicious codes 5. CO5 Determine ethical and legal issues of computer security
17MCS23DA3	Computer Graphics	1. CO1: Explain the concepts used in various computer graphic devices. 2. CO2: Draw different primitive drawing objects and apply transformations. 3. CO3: Apply clipping on points, lines and closed objects with respect to given rectangular window. 4. CO4: Explain the concepts of interactive computer graphics. 5. CO5: Implement the algorithms learnt in some programming language.
17MCS23DB1	Management Information System	1. CO1: Identify with the usage of Information Systems in management. 2. CO2: To be aware of the activities that are undertaken in acquiring an Information System in an organization. 3. CO3: Aware of various Information System solutions like ERP, CRM, SCM and the issues in successful implementation of these technology solutions in any organization. 4. CO4: Learn about the importance of managing organizational change associated with information systems implementation. 5. CO5: Understand the process of developing and implementing information systems.
17MCS23DB2	Digital Image Processing	1. CO1: Quantize and to perform sampling on given images. 2. CO2: Transform and filter the digital image for improving the image quality. 3. CO3: Generate Color images by applying different image characteristics. 4. CO4: Compress the digital images by applying different lossless and lossy compression techniques. 5. CO5: Identify different representations of digital images.
17MCS23DB3	Artificial Intelligence	1. CO1: Learn the concept of Artificial intelligence, problem solving with example and searching process. 2. CO2: Understand basic concepts of Expert system with its architecture and development life cycle.

		3. CO3: Understand the concepts of knowledge, acquisition of knowledge and various levels and schemes with the help of which knowledge can be represented. 4. CO4: Learn the concepts of perception, basic concepts of neural network, learning in neural network with its applications. 5. CO5: Handle the uncertainty in knowledge using fuzzy logic and understand various concepts of fuzzy logic.
7MCS23C1	Operating System & Unix	1. CO1: Design the structure of an Operating system as per requirements. 2. CO2: Perform CPU scheduling to achieve maximum throughput from the system. 3. CO3: Manage the memory space more effectively and efficiently by implementing paging, segmentation. 4. CO4: Compare the performance of any system in terms of different performance evaluators. 5. CO5: Design the Shell scripts in UNIX environment.
17MCS23C2	Visual Programming	1. CO1: Design, creates, build, and debug Visual Basic applications and explore Visual Basic's Integrated Development Environment (IDE). 2. CO2: Implement syntax rules in Visual Basic programs. And explain variables and data types used in program development and apply arithmetic operations for displaying numeric output. 3. CO3: Write and apply decision structures for determining different operations, lop structures to perform repetitive tasks, procedures, sub-procedures, and functions to create manageable code. 4. CO4: Create one and two-dimensional arrays for sorting, calculating, and displaying of data and to write Visual Basic programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, and inheritance, and polymorphism. 5. CO5: Design Windows applications using forms, controls, and events.
17MCS23CL	Practical –II based on 17MCS23C1, 17MCS23C2, 17MCS23DA3	1. CO1: Explain the concepts used in various computer graphic devices. 2. CO2: Draw different primitive drawing objects and apply transformations. 3. CO3: Apply clipping on points, lines and

		closed objects with respect to given rectangular window. 4. CO4: Explain the concepts of interactive computer graphics. 5. CO5: Implement the algorithms learnt in some programming language.
17MCS24C1	Java Programming	1. CO1: Use the characteristics of Java language in a program, variables and data types in program development. 2. CO2: Identify and implement arrays, String and Selection Statements. 3. CO3: Write Java programs using object-oriented programming techniques including classes, objects, methods, instance variables, and interface. Apply Java features to design and implementation of Packages 4. CO4: Design and implementation programs of Exception handling, Packages. 5. CO5: Design and implementation programs of Multithreading Programming, Window based programs.
17MCS24DA1	Data Warehouse and Data Mining	1. CO1: Compare different types of data and to propose different techniques based on it. 2. CO2: Perform the pre-requisite phases: Extract, Transform and Load on the given dataset. 3. CO3: Prepare the given dataset by applying different pre- processing techniques. 4. CO4: Implement different data mining techniques on the pre- processed data set for extracting hidden patterns from data. 5. CO5: Evaluate different techniques and prediction models by using different performance evaluators.
17MCS24DA2	Analysis & Design of Algorithms	1. CO1: Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains; 2. CO2: Analyze worst-case running times of algorithms using asymptotic analysis. 3. CO3: Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. 4. CO4: Compare between different data structures. Pick an appropriate data structure for a design situation. 5. CO5: Apply the algorithms and design techniques to solve problems.
17MCS24DA3	Multimedia and Its Applications	1. CO1: Design Multimedia by incorporating different components of multimedia effectively.

		2. CO2: Identify different 3D technologies including HDTV, UDTV and Hyper speech. 3. CO3: Perform dithering on 24 bit color and 8 bit color and 8 bit grey images. 4. CO4: Compress the photographs and videos by applying lossy as well as loss less techniques. 5. CO5: Make an animated multimedia by incorporating different enhanced features.
17MCS24DB1	Internet and Web Designing	1. CO1: Review the current topics in Web & Internet technologies and describe the basic concepts for website and internet implementation. 2. CO2: Learn the basic working scheme of the Internet and World Wide Web and understand fundamental tools and technologies for web design. 3. CO3: Comprehend the technologies for Hypertext Mark-up Language (HTML), XML and specify design rules in constructing web pages and sites. Effectively deal with programming issues relating to VB Script, JavaScript, Java, ASP, Front Page and Flash. Create and Design websites. 4. CO4: Figure out the various security hazards on the Internet and need of security measures. 5. CO5: Create and use Cascading Style Sheet (CSS) and Information architecture document for a website and construct a web site that conforms to the web standards of today and includes ecommerce and web marketing.
17MCS24DB2	Software Testing	1. CO1: Provide examples for the objectives of testing in different phases of the software life cycle 2. CO2: Explain and compare the terms error, defect, fault, failure and the corresponding terms mistake and bug, using examples 3. CO3: Describe why testing is part of quality assurance and explain how testing contributes to higher quality. 4. CO4: Classify different types of test tools according to their 5. CO5: Define different test cases, considering prioritization, and technical and logical dependencies
17MCS24DB3	Advance in Database Systems	1. CO1: Understand the fundamentals of DBMS and conceptual design using EER model with prerequisite.

		2. CO2: Understand differences between OODBMS and ORDBMS with their various features. 3. CO3: Learn the concepts of Client-Server technology, Parallel and distributed Database with their architectures and concepts. 4. CO4: Learn how to retrieve information and analysis of data using mining approach. 5. CO5: To understand the concepts of advance databases and emerging technologies such as cloud computing and big data with their various framework.
17MCS24CL	Practical-IV based on17MCS24C1, 17MCS24DB1	1. CO1: Clarify the overloading concept with suitable example. 2. CO2: Demonstrate in detailed on multilevel inheritance with suitable example. 3. CO3: Demonstrate on multiple Thread class and use set Priority method with suitable example. 4. CO4: Elaborate on runtime polymorphism with suitable example. 5. CO5: Demonstrate on applet with differentiate between main () method using suitable example. 6. CO6: Learn the basic working scheme of the Internet and World Wide Web and understand fundamental tools and technologies for web design. 7. CO7: Comprehend the technologies for Hypertext Mark-up Language (HTML), XML and specify design rules in constructing web pages and sites. Effectively deal with programming issues relating to VB Script, JavaScript, Java, ASP, Front Page and Flash. 8. CO8: Create and Design websites. 9. CO9: Figure out the various security hazards on the Internet and need of security measures. 10. CO10: Create and use Cascading Style Sheet (CSS) and Information Architecture document for a website and construct a web site that conforms to the web standards of today and includes ecommerce and web marketing.
17MCS24C3	Project Report	1. CO1: Use of various software engineering principles used in developing programming Solutions to a system. 2. CO2: Identify the programming

		technologies: languages and database etc to be used for developing a software solution. 3. CO3: Understand and analyze the work schedule and its phases to develop a Project. 4. CO4: Implement the software design in the chosen programming languages/database etc. 5. CO5: Test the code for validation and verification of user requirements of the software. Work in a team for software development.
17MCS24C3	Project Guidelines	1. Each student should carry out Project using the software development tools /languages/ technologies that they have learnt and/or have studied during the concerned semester Or any other development tools in view of the ongoing Software Industry trends. 2. It should be done by the student in an organization/college under the supervision of the staff(s) assigned by Head of the Department/Director/Principal. 3. The Project has to be assigned to the students in the beginning of the 4th Semester.