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DEPARTMENT OF COMPUTER SCIENCE

Curriculum for B.Sc. Honours in Computer Science (Major)
As per
NEP- 2020

Syllabus for I to VIII semester
B.Sc. Honours in Computer Science
w.e.f 2024-25

Resolutions adopted by the Board of Studies (BoS) of B.Sc. Honours in Computer Science (Major) 2024-25

1. Approval and Ratification of changes/modifications in the curriculum designed for I/II/III/IV/V/VI/VII and VIII Semesters under Choice Based Credit System for Major and Minor subjects for the Academic Year 2024-25 onwards.

2. Approval of Multi Disciplinary Courses, Value Added Certificate Courses, Skill Enhancement Courses, Ability Enhancement Compulsory Courses (Languages), Open Online Transdisciplinary Courses, Environmental Course, IKS (Two courses with Zero (0) credits,

3. Approval of Community Service Project of 180 hours with 4 credits after the end of II semester, Short Term Internship/ Apprenticeship/ Online Job Training of 180 hours with 4 credits after the end of IV Semester, Semester Internship/Apprenticeship/ Online Job Training with 12 credits in the VI Semester.

4. Approval of Multiple Entry and Multiple Exit from Programme

5. Suggestions for innovative teaching and evaluation techniques, students' seminars, workshops and student-centred activities, research and extension activity/start-ups, value added certificate courses to be introduced.

6. Approval of Question Paper Blueprint and Model Question Paper for 60 External Marks and 40 Internal marks for core and language courses, 50 External Marks for Multidisciplinary Courses and Skill Enhancement Courses.

7. List of examiners.

8. Any other relevant matter.

Scheme of Evaluation for Practical examinations

The duration of examination for each theory course is 3Hrs.
The duration of each practical examination is 3Hrs with 50 Max. Marks
Distribution of marks
Program and output: 30M
Viva-Voce: 10M
Record: 10M

Internal: External Evaluation is 40:60

The Internal Evaluation Method (CIA)

Type of Assessment	Max Marks
2 Mid Examinations	20M + 20 M = 40 M
Seminar/ Group Discussion	5 M + 5 M = 10 M
Project Based Learning	10M
Peer Group Learning	10M
Attendance and Participation in Clean and Green Activities	5 M
	75 Marks

Scale down to 40 Marks.

COURSE STRUCTURE

Year	Semester	S.No	Title of the Course	Course Code	No. of Hrs /Week	No. of Credits
I	I	1	Essentials and Applications of Mathematical, Physical and Chemical Sciences	24BSPM11	3+2	4
		2	Advances in Mathematical, Physical and Chemical Sciences	24BSPM12	3+2	4
	II	3	Problem Solving using C	24CSCM21	3	3
			Problem Solving using C Lab	24CSCM2P	2	1
		4	Digital Logic Design	24CSCM22	3	3
			Digital Logic Design Lab	24CSCM22P	2	1
			Community Service Project	INTERNSHIP001	4	8 weeks
II	III	5	Object Oriented Programming using Java	24CSCM31	3	3
			Object Oriented Programming using Java Lab	24CSCM31P	2	1
		6	Data Structures using C	24CSCM32	3	3
			Data Structures using C Lab	24CSCM32P	2	1
		7	Computer Organization	24CSCM33	3	3
			Computer Organization Lab	24CSCM33P	2	1
		8	Operating Systems	24CSCM34	3	3
			Operating Systems-	24CSCM34P	2	1
	IV	9	Database Management System	24CSCM41	3	3
			Database Management System Lab	24CSCM41P	2	1
		10	Object Oriented Software Engineering	24CSCM42	3	3
			Object Oriented Software Engineering Lab	24CSCM42P	2	1
		11	Data Communications and Computer Networks	24CSCM43	3	3
			Data Communications and Computer Networks Lab	24CSCM43P	2	1
			Short Term Internship	INTERNSHIP002	4	8weeks

III	V	12	Web Interface Designing Technologies	24CSCM51	3	3
			Web Interface Designing Technologies Lab	24CSCM51P	2	1
		13	Web Applications Development using PHP& MYSQL	24CSCM52	3	3
			Web Applications Development using PHP& MYSQL Lab	24CSCM52P	2	1
		14 A	Internet of Things	24CSCM53A	3	3
			Internet of Things Lab	24CSCM53AP	2	1
		OR				
		14B	Foundations of Data Science	24CSCM53B	3	3
			Foundations of Data Science Lab	24CSCM53BP	2	1
		15A	IoT Applications Development Programming	24CSCM54A	3	3
			IoT Applications Development Programming Lab	24CSCM54AP	2	1
		OR				
		15B	Application development using Python	24CSCM54B	3	3
			Application development using Python Lab	24CSCM54BP	2	1
	VI		Internship	INTERNSHIP003	12	15 weeks
	VII	16A	Advanced Data Structures	24CSCM71A	3	3
			Advanced Data Structures Lab	24CSCM71AP	2	1
		OR				
		16B	Artificial Intelligence	24CSCM71B	3	3
			Artificial Intelligence Lab	24CSCM71BP		
		17A	Computer Graphics	24CSCM72A	3	3
			Computer Graphics Lab	24CSCM72AP	2	1
		OR				
		17B	Design and Analysis of Algorithms	24CSCM72B	3	3
			Design and Analysis of Algorithms Lab	24CSCM72BP	2	1
		18A	Principles of Machine Learning	24CSCM73A	3	3
			Principles of Machine Learning	24CSCM73AP	2	1

			Lab			
		OR				
		18B	Software Testing	24CSCM73B	3	3
			Software Testing Lab	24CSCM73BP	2	1
		Skill Enhancement Courses				
		19A	Advanced Java Programming	24CSCS71A	3	3
			Advanced Java Programming Lab	24CSCS71AP	2	1
		OR				
		19B	MEAN Stack Development	24CSCS71B	3	3
			MEAN Stack Development Lab	24CSCS71BP	2	1
		20A	Mobile Application Development	24CSCS72A	3	3
			Mobile Application Development Lab	24CSCS72AP	2	1
		OR				
		20B	R Programming	24CSCS72B	3	3
			R Programming Lab	24CSCS72BP	2	1
	VIII	21A	Big Data Technologies	24CSCM81A	3	3
			Big Data Technologies Lab	24CSCM81AP	2	1
		OR				
		21B	Compiler Design	24CSCM81B	3	3
			Compiler Design Lab	24CSCM81BP	2	1
		‘ 22A	Data Mining Concepts & Techniques	24CSCM82A	3	3
			Data Mining Concepts & Techniques Lab	24CSCM82AP	2	1
		OR				
		22B	Digital Image Processing	24CSCM82B	3	3
			Digital Image Processing Lab	24CSCM82BP	2	1
		23A	Information Security and Cryptography	24CSCM83A	3	3
			Information Security and Cryptography Lab	24CSCM83AP	2	1

		OR				
		23B	Mobile ADHOC and Sensor Networks	24CSCM83B	3	3
			Mobile ADHOC and Sensor Networks Lab	24CSCM83BP	2	1
		Skill Enhancement Courses				
		24A	Advanced DBMS	24CSCS81A	3	3
			Advanced DBMS Lab	24CSCS81AP	2	1
		OR				
		24B	Cloud Computing	24CSCS81B	3	3
			Cloud Computing Lab	24CSCS81BP	2	1
		25A	Computer Vision	24CSCS82A	3	3
			Computer Vision Lab	24CSCS82AP	2	1
		OR				
		25B	Digital Forensics	24CSCS82B	3	3
			Digital Forensics Lab	24CSCS82BP	2	1

COMPUTER SCIENCE MINOR COURSE STRUCTURE

(Sem-I to Sem-VIII)

Year	Semester	Course Code	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	-	-	-	-
	II	24CSCN21	Problem Solving Using C	3	3
		24CSCN21P	Problem Solving Using C Lab	2	1
II	III	24CSCN31	Object Oriented Programming using Java	3	3
		24CSCN31P	Object Oriented Programming using Java Lab	2	1
	IV	24CSCN41	Database Management System	3	3
		24CSCN41P	Database Management System Lab	2	1
		24CSCN42	Object Oriented Software Engineering	3	3
		24CSCN42P	Object Oriented Software Engineering Lab	2	1
III	V	24CSCN52	Web Applications Development using PHP & MYSQL	3	3
		24CSCN52P	Web Applications Development using PHP & MYSQL Lab	2	1
		24CSCN53A	Internet of Things	3	3
		24CSCN53AP	Internet of Things Lab	2	1
IV	VII	-	-	-	-
	VIII	-	-	-	-

Curriculum framework BSc Single major Programme

B.Sc (Honours) with Single Major																							
Semester	**Major* (4 Cr)**			**Minor (4 Cr)**			**Languages (3 Cr)**			**Multi Disny' (2 Cr)**			**Skill Enhancement Courses (2Cr)**			**OOTC**			**Env. Edn (2 Cr)**			**Total**		
	C	***H***	***Cr***	**C**	***H***	***Cr***	**C**	***H***	***Cr***	**C**	***H***	***Cr***	**C**	***H***	***Cr***	**C**	***H***	***Cr***	**C**	***H***	***Cr***	**C**	***H***	**Cr**
Sem 1	2*	10	8				2	8	6	1	2	2	2	4	4							7	24	20
Sem 2	2	6+4	8	1	3+2	4	2	8	6				2	4	4							7	27	22
Community Service Project of 180 hours with 4 Credits. Student is eligible for Exit Option-1 with the award of Certificate in respective discipline																								
Sem 3	4	12+8	16	1	3+2	4				1	2	2	1	2	2							7	29	24
Sem 4	3	9+6	12	2	6+4	8				1	2	2	1	2	2							7	29	24
Short-Term Internship/Apprenticeship/OJT of 180 hours with 4 Credits. Student is eligible for Exit Option-2 with the award of Diploma in respective major with minor																								
Sem 5	4	12+8	16	2	6+4	8													1	2	2	7	32	26
Sem 6	**Semester Internship/Apprenticeship/OJT with 12 Credits. Student is eligible for Exit Option-3 with the award of Degree in respetive major with**																							
																			IKS#					
Sem 7	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22
Sem 8	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22
	21		84	6		24	4		12	3	6	6	10	32	28	2	4	4	2	4	0	47		**160**
20 Additional Credits for 10 month mandatory Internship/OJT/Apprenticeship																								
C Courses **H** Hours **Cr** Credits **OOTC** Open Online Transdisciplinary																								
IKS# Indian Knowledge Systems - Audit Course																								

Credit Requirements

- For UG Honours Degree the number of credits required is 160 along with 20 additional credits assigned for Community Service Project (4 credits), Short Term Internship (4 credits) and Semester Internship (12 credits).
- These 160 credits are apportioned as, 84 for Major Courses, 24 for Minor Courses, 12 for Languages, 6 for Multidisciplinary Courses, 28 for Skill Courses, 4 for Open Online Transdisciplinary Courses and 2 for Common Value-Added Courses.
- **The thumb rule for assigning credits is 1 hour of theory per week is equivalent to 1 credit. Similarly, 2 hours of practical per week is equivalent to 1 credit. The credits assigned for Internship/Apprenticeship/OJT are not to be equalized with the hours of work done**.
- A student can acquire a maximum of 40% of credits online

Major Courses

- Major discipline is the discipline or subject of main focus and the degree will be awarded in that discipline. Students should secure the minimum prescribed number of credits, i.e., 84 (about 50% of total credits) through core courses in the major discipline.
- A student of UG Honours Degree has to study 21 course papers with 84 credits in the chosen major.

Minor Courses

- Students have to choose a Minor in the second semester. The student can choose a minor cutting across the disciplines or from the allied disciplines.
- A student has to study 6 courses in the chosen minor with 24 credits. The minor courses start from the second semester onwards
- **A student can complete a second minor online from approved sources during the period of study and submit the credits to the institution for inclusion in the Degree certificate.**
- **Minor courses can be studied offline or online or in blended mode**.

Languages

- Two courses in English Language and two courses in Modern Indian Language are to be completed in the first two semesters.

- Each language course is taught for 4 hours with 3 credits.

- A student can opt for doing the English Language Courses online which are equivalent to IELTS/TOEFL/OET, etc. Or the minimum required scores for qualifying in IELTS/TOEFL/OET can be reckoned for the 6 credits assigned for English Language

Skill Courses

- Enhancing student employability is the top priority for higher education. Employability is a measure of a student's ability to secure their first job and remain employed throughout their working lives.

- A pool of Skill Enhancement Courses is offered in Semesters I to IV. These Skill Enhancement Courses are contemporary in nature and not major-specific.

- A student has to complete 6 such courses (2 credits each) in Semesters I to IV assigned with 12 credits. Students are offered choices for sAINcting skill enhancement courses of their interest.

- Major subject-specific Skill Enhancement courses with choices are offered in Semester V/VI as two of the four major courses.

- And two Skill Enhancement courses each with choices are offered in Semesters VII and VIII in the concerned major.

Semester	Skill Courses	Title of the course	Course Code	No of credits	No of hours per week
I	**A student has to choose any TWO of the following four courses**	Entrepreneurship Development	24EPDS11	2	2
		Leadership Skills	24LSSS12	2	2
		Analytical Skills	24ALSS13	2	2
		Communication Skills	24CCSS14	2	2
II	**A student has to choose any TWO of the following five courses**	Business Writing	24BNSS21	2	2
		Marketing Skills	24MKTS22	2	2
		Investment Planning	24INVS23	2	2
		Stock Market Operations	24SMOS24	2	2
		Digital Literacy	24DTLS25	2	2
III	**A student has to choose any ONE of the following four courses**	Business Forecasting	24BFCS31	2	2
		Project Management	24PJMS32	2	2
		Information and Communication Technology	24ICTS33	2	2
		Data Analysis	24DTAS34	2	2
IV	**A student has to choose any ONE of the following four courses**	Cyber Security	24CYSS41	2	2
		Digital Marketing	24DGMS42	2	2
		Tourism Guidance	24TRGS43	2	2
		Design thinking	24DGTS44	2	2

Multidisciplinary Courses

- In consonance with NEP – 2020 all UG students are required to undergo multidisciplinary courses. These courses are intended to broaden the intellectual experience.

- **Students are not allowed to choose the courses in a major discipline or repeat courses already undergone at the higher secondary level or Intermediate level or 12th class as the multidisciplinary course.**

- A student has to complete 3 multidisciplinary courses each carrying 2 credits.
- Students are offered choices for selecting multidisciplinary courses of their interest.

Semester	Multidiscipline Course	Title of the course	Course Code	No of Credits	No of Hours per week
I	**A student has to choose ONE course from the six courses listed against the semester.**	Introduction to Social Work	24ISWD11	2	2
		Principles of Psychology	24POPD12	2	2
		Indian History	24INHD13	2	2
		Principles of Biological Sciences	24PBSD14	2	2
		Principles of Chemical Sciences	24PCSD15	2	2
		Principles of Physical Sciences	24PPSD16	2	2
III	**A student has to choose ONE course the six courses listed against the semester.**	Introduction to Public Administration	24IPAD31	2	2
		Principles of Management	24POMD32	2	2
		Principles of Accounting	24POAD33	2	2
		Basic electronics	24BELD34	2	2
		Health and Hygiene	24HAHD35	2	2
		Basic Mathematics	24BMTD36	2	2
IV	**A student has to choose ONE course from the six courses listed against the semester.**	Fundamentals of Economics	24FOED41	2	2
		Indian Philosophy	24IPYD42	2	2
		Performing Arts	24PATD43	2	2
		Introduction to Geography	24IOGD44	2	2
		Basic Statistics	24BSTD45	2	2
		Introduction to Nanotechnology	24ITND46	2	2

Common Value-Added Courses

- Common Valued Added Course includes Environmental science/education, and shall carry 2 credits.

Semester	Common Value-added Course	Title of the course	Course Code	No of credits	No of hours per week
V		Environmental Education	**24ENEV51**	2	2

List of add on/certificate/value added program which are optional and offered outside the curriculum of the programs by the department

S.No	**Title of the Value-added course**	**Course Code**	**No of credits**

Courses on Indian Knowledge Systems (IKS)

- Courses on IKS are integrated into the curricular framework. The IKS course shall be an Audit Course which is a mandatory course with only a Pass or Fail.

- A student has to complete 2 courses on IKS one in the VII semester and one in the VIII semester.

- Students are offered choices for selecting IKS courses of their interest.

Semester	IKS	Tile of the course	No of credits	No of hours per week
VII	IKS 1	IKS 1	0	2
VIII	IKS 2	IKS 2	0	2

Open Online Transdisciplinary Courses (OOTC)

- Two mandatory Open Online Transdisciplinary Courses, with 2 credits per course, are to be done by the students, one in each of Semesters VII and VIII.

- Students are free to select courses of their interest from any discipline.

Semester	OOTC	Tile of the course	No of credits	No of hours per week
VII		OOTC 1	2	2
VIII		OOTC 2	2	2

10-month mandatory Internship

Three internships are mandatory for all students irrespective of the of the Program of study.

A. First internship (April-May after 1st year examinations): Community Service Project
   - To inculcate social responsibility and compassionate commitment among the students, the summer vacation in the intervening 1st and 2nd years of study shall be for Community Service Project.

   Learning outcomes:
   - To facilitate an understanding of the issues that confronts the vulnerable/marginalized sections of the society.
   - To initiate team processes with the student groups for societal change.
   - To provide students an opportunity to familiarize themselves with urban/rural community they live in.
   - To enable students to engage in the development of the community.
   - To plan activities based on the focused groups.
   - To know the ways of transforming society through systematic programme implementation.

B. Second Internship (April-May after 2nd year examinations): Apprenticeship / Internship / On-the-job training / In-house Project / Off-site Project

   - To make the students employable, an Apprenticeship / Internship / On the job training / In-house Project / Off-site Project shall be undertaken by the students in the intervening summer vacation between the 2nd and 3rd years.

   Learning outcomes
   - Explore career alternatives prior to graduation.
   - Integrate theory and practice.
   - Assess interests and abilities in their field of study.
   - Learn to appreciate work and its function towards future .
   - Develop work habits and attitudes necessary for job success.
   - Develop communication, interpersonal and other critical skills in the future job.
   - Build a record of work experience.
   - Acquire employment contacts leading directly to a full-time job following graduation from college.

C. Third internship (5th/6thSemester period):

During the entire 5th /6th Semester, the student shall undergo

Apprenticeship / Internship / On the Job Training. This is to ensure that the students develop hands on technical skills which will be of great help in facing the world of work.

Learning outcomes

- Explore career alternatives prior to graduation.
- Integrate theory and practice.
- Assess interests and abilities in their field of study.
- Learn to appreciate work and its function towards future.
- Develop work habits and attitudes necessary for job success.
- Develop communication, interpersonal and other critical skills in the future job.
- Build a record of work experience.
- Acquire employment contacts leading directly to a full-time job following graduation from college.

Internal Evaluation

Internal: External Evaluation is 40:60

The Internal Evaluation Method (CIA)

Mid exam	Type of Assessment	Max Marks
I	Assignment	10M
	Seminar/ Study project/Filed trip/Quiz etc	10M
	NCC/NSS (extra-curricular)	10M
	Exam (Summative)	20M
II	Assignment	10M
	Seminar/ Study project/Filed trip/Quiz etc	10M
	NCC/NSS (extra-curricular)	10M
	Exam (Formative)	20M
Grand total		100M
Total marks Scaled down to 40M		

Multiple Entry and Exit Options

Operative Details of ME-ME

1st year of Entry 1: **The entry requirement for the 1st year of 4-year Degree (Level – 4.5 of National Credit Framework (NCrF) of UGC) is Intermediate/12th class of CBSE/ or any other equivalent certificate approved by the Board of Intermediate Education.**

Exit 1: A Certificate will be awarded when a student exits at the end of the year 1 (Level 4.5).

Certificate in Sciences is to be awarded, if students exit after successful completion of 1 year of study in B.Sc. However, the students are required to pass all courses, Languages, Multidisciplinary, Skill Enhancement and Core Courses in Major and Minor along with completion of Community Service Project in the summer term.

2nd year:

Entry 2: **The entry requirement for 2nd year of 4-year Degree (Level – 5 of NCrF of UGC) is a Certificate obtained after completing the first two semesters of the**

undergraduate programme. A student can seek entry into the 2nd year of study in a college, provided there are vacancies in that particular programme in that college. The transfer admission shall be within the intake permitted to the college.

Exit 2: A Diploma will be awarded when a student exits at the end of the 2nd year (Level 5 of NCrF).

Diploma in Sciences is to be awarded if students exit after successful completion of 2nd year of study in B.Sc. However, the students are required to pass all courses, Languages, Multidisciplinary, Skill Enhancement and Core Courses in Major and Minor along with completion of Community Service Project in the summer term between 1st and 2nd year and short-term internship in the summer term between 2nd and 3rd year.

3rd year:

Entry 3: **The entry requirement for 3rd year of 4-year Degree (Level – 5.5 of NCrF of UGC) is a Diploma obtained after completing two years (4 semesters) of the undergraduate programme. A student can seek entry into the 3rd year of study in a college, provided there are vacancies in that particular programme in that college. The transfer admission shall be within the intake permitted to the college**.

Exit 3: A Degree will be awarded when a student exits at the end of the 3rd year (Level – 5.5 of NCrF). Bachelor's Degree in Sciences B.Sc
is to be awarded if students exit after successful completion of 3rd year of study. However, the students are required to pass all courses, Languages, Multidisciplinary, Skill Enhancement and Core Courses in Major and Minor along with completion of Community Service Project in the summer term between 1st and 2nd year and short-term internship in the summer term between 2nd and 3rd year and a full-semester internship.

The Degree awarded shall include the Major and Minor/s in parenthesis. For Ex., **B.Sc (Computer Science with Mathematics Minor)**

4th year:

Entry 4: **The entry requirement for 4th year of 4-year Degree (Level – 6 of NCrF of UGC) is a degree obtained after completing three years (6 semesters) of the undergraduate programme. A student can seek entry into the 4th year of study in a college, provided there are vacancies in that particular programme in that college. The transfer admission shall be within the intake permitted to the college**.

Exit 4: A Degree with Honours will be awarded when a student exits at the end of the 3rd year (Level – 6 of NCrF). Bachelor's Degree with Honours in Sciences is to be awarded if students exit after successful completion of 4th year of study.

The name of the Major/s shall be indicated in parenthesis and the name of the Minor/s. For ex., B.Sc Honours (Computer Science with Mathematics Minor).

If the student completes the 4th year with courses in research methodologies and a rigorous research project in one of the major courses of study, a Bachelor degree (Honours with research) is awarded.

Career Opportunities and Graduate Employability

- Career options and graduate employability are the significant program outcomes and benefits of the 4-year Honours Degree Program. The program equips students

with the necessary knowledge, skills, and experiences to pursue diverse career paths and enhances their potential for successful employment after graduation.

- The 4-year Honours Degree Program provides students with specialized knowledge and expertise in their chosen field of study through advanced coursework and in-depth study.
- Graduates possess a deep understanding of their subject, making them more attractive to employers seeking candidates with specialized knowledge and skills.
- Throughout the program, students develop a range of industry-relevant skills such as critical thinking, problem-solving, data analysis, research, and communication skills.
- Graduates are well-prepared to meet the demands of the job market and can apply their skills effectively in professional settings.
- Honours Degree Program incorporate mandatory internships; hence graduates gain valuable practical experience during their studies, enhancing their employability by demonstrating hands-on skills and industry exposure.
- Honours Degree Program emphasizes critical thinking and adaptability, preparing students for the rapidly changing job market.
- Graduates are equipped to navigate and thrive in dynamic work environments, and they possess a strong foundation for continuous learning and skill development.
- As a result of the specialized knowledge, skills, and experiences gained, graduates are highly sought after by employers. And enjoy enhanced employability and marketability, increasing their chances of securing rewarding job opportunities and career advancement.

Further Education and Postgraduate Studies

- After completion of the first 3 years of study in the Honours Degree Program, if a student exits, he/she is awarded a Degree and is eligible to pursue a 2-year Postgraduate Program.
- A student getting a UG Honours Degree can do 1-year Postgraduate Program.
- A student awarded with UG Honours Degree with Research is eligible to get direct admission into Ph.D. program provided the student secures 75% and above marks

	Programme Outcome (POs)
PO 1	**Critical Thinking**: Ability to take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO 2	**Effective Communication:** Ability to speak, read, write, and listen clearly in person and through AINctronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media, and technology.
PO 3	**Social Interaction:** Ability to elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO 4	**Effective Citizenship:** Ability to demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO 5	**Ethics:** Ability to recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO 6	**Environment and Sustainability:** Ability to understand the issues of environmental contexts and sustainable development
PO 7	**Employability skills:** Equipping graduates with the essential abilities and knowledge to excel in their chosen careers
PO 8	**Entrepreneurship skills:** Seeks to empower students with the competencies needed to be successful entrepreneurs, enabling them to launch, operate, and innovate in their own businesses or entrepreneurial ventures.
PO 9	**Multidisciplinary Knowledge:** Multidisciplinary knowledge is crucial for developing graduates who can think critically, innovate, and collaborate effectively. This approach not only enhances the educational experience but also ensures that students are well-prepared to meet the challenges of an increasingly complex and interconnected world.
PO 10	**Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

	Program specific Outcomes (PSOs)
PSO 1	Apply Computer Science knowledge to analyze, design and develop computing solutions by employing modern computer languages, environments and platforms that can solve complex problems.
PSO 2	Anticipate the changing direction of computational technology, evaluate it and communicate the likely utility of that for building software systems that would perform tasks related to industry, research and education.
PSO 3	Inculcate the knowledge of Computer Science principles to develop projects effectively and create innovative career paths.
PSO 4	Analyze, design & develop components or processes by using knowledge of algorithms, Cyber Security, DBMS, Object Oriented Software Engineering, Digital Image Processing, Research Methodology, Network, Artificial Intelligence, IoT, Digital Forensics and Big Data concepts to evaluate socially relevant issues and provide solutions.
PSO 5	Develop software systems that would perform tasks related to Research, Education and Training /E-governance

Courses mapped with Employability skills/Cross cutting issues

Year	Semester	S.No	Title of the Course	Course Code	Employability skills	Cross cutting issues
I	I	1	Essentials and Applications of Mathematical, Physical and Chemical Sciences	24BSPM11	√	√
		2	Advances in Mathematical, Physical and Chemical Sciences	24BSPM12	√	√
	II	3	Problem Solving using C	24CSCM21	√	√
			Problem Solving using C Lab	24CSCM2P	√	√
		4	Digital Logic Design	24CSCM22	√	√
			Digital Logic Design Lab	24CSCM22P	√	√
			Community Service Project	INTERNSHIP001	√	√
II	III	5	Object Oriented Programming using Java	24CSCM31	√	√
			Object Oriented Programming using Java Lab	24CSCM31P	√	√
		6	Data Structures using C	24CSCM32	√	√
			Data Structures using C Lab	24CSCM32P	√	√
		7	Computer Organization	24CSCM33	√	√
			Computer Organization Lab	24CSCM33P	√	√
		8	Operating Systems	24CSCM34	√	√
			Operating Systems-	24CSCM34P	√	√
	IV	9	Database Management System	24CSCM41	√	√
			Database Management System Lab	24CSCM41P	√	√
		10	Object Oriented Software Engineering	24CSCM42	√	√
			Object Oriented Software Engineering Lab	24CSCM42P	√	√
		11	Data Communications and Computer Networks	24CSCM43	√	√

			Data Communications and Computer Networks Lab	24CSCM43P	√	√
			Short Term Internship	INTERNSHIP002	√	√

III	V	12	Web Interface Designing Technologies	24CSCM51	√	√
			Web Interface Designing Technologies Lab	24CSCM51P	√	√
		13	Web Applications Development using PHP& MYSQL	24CSCM52	√	√
			Web Applications Development using PHP& MYSQL Lab	24CSCM52P	√	√
		14 A	Internet of Things	24CSCM53A	√	√
			Internet of Things Lab	24CSCM53AP	√	√
		OR				
		14B	Foundations of Data Science	24CSCM53B	√	√
			Foundations of Data Science Lab	24CSCM53BP	√	√
		15A	IoT Applications Development Programming	24CSCM54A	√	√
			IoT Applications Development Programming Lab	24CSCM54AP	√	√
		OR				
		15B	Application development using Python	24CSCM54B	√	√
			Application development using Python Lab	24CSCM54BP	√	√
	VI		Internship	INTERNSHIP003	√	√
	VII	16A	Advanced Data Structures	24CSCM71A	√	√
			Advanced Data Structures Lab	24CSCM71AP	√	√
		OR				
		16B	Artificial Intelligence	24CSCM71B	√	√
			Artificial Intelligence Lab	24CSCM71BP	√	√
		17A	Computer Graphics	24CSCM72A	√	√
			Computer Graphics Lab	24CSCM72AP	√	√
		OR				
		17B	Design and Analysis of	24CSCM72B	√	√

			Algorithms			
			Design and Analysis of Algorithms Lab	24CSCM72BP	√	√
		18A	Principles of Machine Learning	24CSCM73A	√	√
			Principles of Machine Learning Lab	24CSCM73AP	√	√
		OR				
		18B	Software Testing	24CSCM73B	√	√
			Software Testing Lab	24CSCM73BP	√	√
		Skill Enhancement Courses				
		19A	Advanced Java Programming	24CSCS71A	√	√
			Advanced Java Programming Lab	24CSCS71AP	√	√
		OR				
		19B	MEAN Stack Development	24CSCS71B	√	√
			MEAN Stack Development Lab	24CSCS71BP	√	√
		20A	Mobile Application Development	24CSCS72A	√	√
			Mobile Application Development Lab	24CSCS72AP	√	√
		OR				
		20B	R Programming	24CSCS72B	√	√
			R Programming Lab	24CSCS72BP	√	√
	VIII	21A	Big Data Technologies	24CSCM81A	√	√
			Big Data Technologies Lab	24CSCM81AP	√	√
		OR				
		21B	Compiler Design	24CSCM81B	√	√
			Compiler Design Lab	24CSCM81BP	√	√
		‘ 22A	Data Mining Concepts & Techniques	24CSCM82A	√	√
			Data Mining Concepts & Techniques Lab	24CSCM82AP	√	√
		OR				
		22B	Digital Image Processing	24CSCM82B	√	√

			Digital Image Processing Lab	24CSCM82BP	√	√
		23A	Information Security and Cryptography	24CSCM83A	√	√
			Information Security and Cryptography Lab	24CSCM83AP	√	√
		OR				
		23B	Mobile ADHOC and Sensor Networks	24CSCM83B	√	√
			Mobile ADHOC and Sensor Networks Lab	24CSCM83BP	√	√
		Skill Enhancement Courses				
		24A	Advanced DBMS	24CSCS81A	√	√
			Advanced DBMS Lab	24CSCS81AP	√	√
		OR				
		24B	Cloud Computing	24CSCS81B	√	√
			Cloud Computing Lab	24CSCS81BP	√	√
		25A	Computer Vision	24CSCS82A	√	√
			Computer Vision Lab	24CSCS82AP	√	√
		OR				
		25B	Digital Forensics	24CSCS82B	√	√
			Digital Forensics Lab	24CSCS82BP	√	√

Courses Mapped with POs

Title of the Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
Essentials and Applications of Mathematical, Physical and Chemical Sciences	√	√		√		√			√	√
Advances in Mathematical, Physical and Chemical Sciences	√		√	√		√			√	
Problem Solving using C	√		√		√			√		
Problem Solving using C Lab	√		√		√				√	√
Digital Logic Design	√		√		√				√	√
Digital Logic Design Lab	√	√		√		√			√	√
Community Service Project	√	√		√		√			√	√
Object Oriented Programming using Java	√	√		√		√			√	√
Object Oriented Programming using Java Lab	√	√		√		√			√	√
Data Structures using C	√	√		√		√			√	√
Data Structures using C Lab	√	√		√		√			√	√
Computer Organization	√	√		√		√			√	√
Computer Organization Lab	√	√		√		√			√	√
Operating Systems	√	√		√		√			√	√
Operating Systems Lab	√	√		√		√			√	√

Database Management System	√	√		√		√			√	√
Database Management System Lab	√	√		√		√			√	√
Object Oriented Software Engineering	√	√		√		√			√	√
Object Oriented Software Engineering Lab	√	√		√		√			√	√
Data Communications and Computer Networks	√	√		√		√			√	√
Data Communications and Computer Networks Lab	√	√		√		√			√	√
Short Term Internship	√	√		√		√			√	√
Web Interface Designing Technologies	√	√		√		√			√	√
Web Interface Designing Technologies Lab	√	√		√		√			√	√
Web Applications Development using PHP& MYSQL	√	√		√		√			√	√
Web Applications Development using PHP& MYSQL Lab	√	√		√		√			√	√
Internet of Things	√	√		√		√			√	√
Internet of Things Lab	√	√		√		√			√	√
Foundations of Data Science	√	√		√		√			√	√
Foundations of Data Science Lab	√	√		√		√			√	√
IoT Applications Development Programming	√	√		√		√			√	√
IoT Applications Development Programming Lab	√	√		√		√			√	√
Application development using Python	√	√		√		√			√	√
Application development using Python Lab	√	√		√		√			√	√
Internship	√	√		√		√			√	√

Advanced Data Structures	√	√		√		√			√	√
Advanced Data Structures Lab	√	√		√		√			√	√
Artificial Intelligence	√	√		√		√			√	√
Artificial Intelligence Lab	√	√		√		√			√	√
Computer Graphics	√	√		√		√			√	√
Computer Graphics Lab	√	√		√		√			√	√
Design and Analysis of Algorithms	√	√		√		√			√	√
Design and Analysis of Algorithms Lab	√	√		√		√			√	√
Principles of Machine Learning	√	√		√		√			√	√
Principles of Machine Learning Lab	√	√		√		√			√	√
Software Testing	√	√		√		√			√	√
Software Testing Lab	√	√		√		√			√	√
Advanced Java Programming	√	√		√		√			√	√
Advanced Java Programming Lab	√	√		√		√			√	√
MEAN Stack Development	√	√		√		√			√	√
MEAN Stack Development Lab	√	√		√		√			√	√
Mobile Application Development	√	√		√		√			√	√
Mobile Application Development Lab	√	√		√		√			√	√
R Programming	√	√		√		√			√	√
R Programming Lab	√	√		√		√			√	√
Big Data Technologies	√	√		√		√			√	√
Big Data Technologies Lab	√	√		√		√			√	√
Compiler Design	√	√		√		√			√	√
Compiler Design Lab	√	√		√		√			√	√

Data Mining Concepts & Techniques	√	√		√		√			√	√
Data Mining Concepts & Techniques Lab	√	√		√		√			√	√
Digital Image Processing	√	√		√		√			√	√
Digital Image Processing Lab	√	√		√		√			√	√
Information Security and Cryptography	√	√		√		√			√	√
Information Security and Cryptography Lab	√	√		√		√			√	√
Mobile ADHOC and Sensor Networks	√	√		√		√			√	√
Mobile ADHOC and Sensor Networks Lab	√	√		√		√			√	√
Advanced DBMS	√	√		√		√			√	√
Advanced DBMS Lab	√	√		√		√			√	√
Cloud Computing	√	√		√		√			√	√
Cloud Computing Lab	√	√		√		√			√	√
Computer Vision	√	√		√		√			√	√
Computer Vision Lab	√	√		√		√			√	√
Digital Forensics	√	√		√		√			√	√
Digital Forensics Lab	√	√		√		√			√	√

Minor Courses Mapped with POs

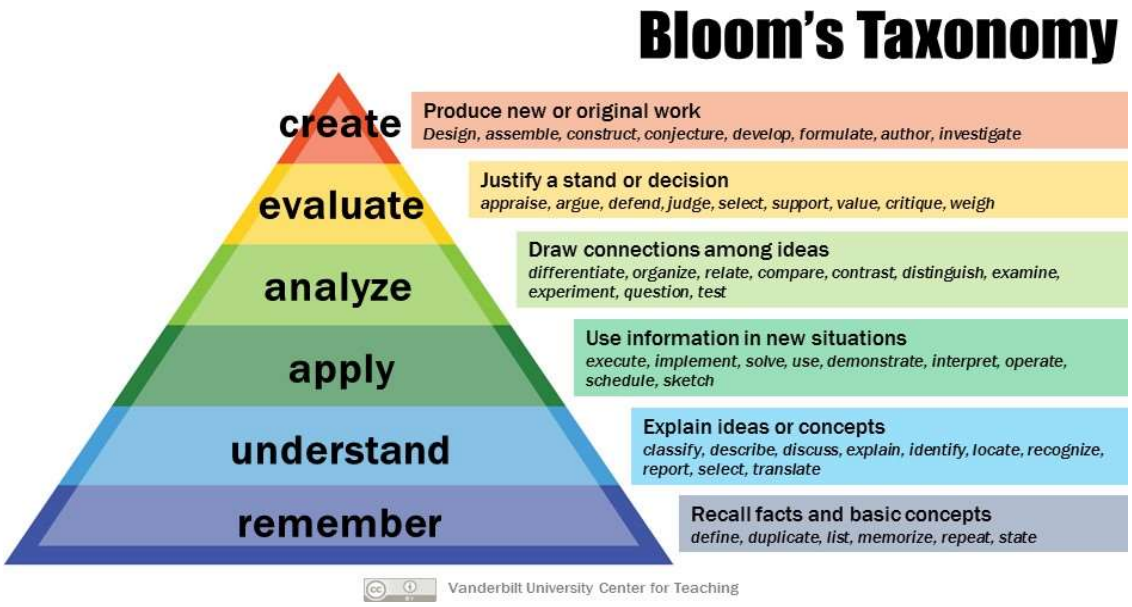
Title of the Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
Problem Solving using C	√		√		√			√		
Problem Solving using C Lab	√		√		√				√	√
Object Oriented Programming using Java	√	√		√		√			√	√
Object Oriented Programming using Java Lab	√	√		√		√			√	√
Database Management System	√	√		√		√			√	√
Database Management System Lab	√	√		√		√			√	√
Object Oriented Software Engineering	√	√		√		√			√	√
Object Oriented Software Engineering Lab	√	√		√		√			√	√
Web Applications Development using PHP& MYSQL	√	√		√		√			√	√
Web Applications Development using PHP& MYSQL Lab	√	√		√		√			√	√
Internet of Things	√	√		√		√			√	√
Internet of Things Lab	√	√		√		√			√	√

List of new courses introduced during 2024-25

S.No	Title of the course	Course code	Year of introduction
1	Computer Organization	24CSCM33	2024-25
2	Computer Organization Lab	24CSCM33P	2024-25
3	Object Oriented Software Engineering	24CSCM42	2024-25
4	Object Oriented Software Engineering Lab	24CSCM42P	2024-25
5	Data Communications and Computer Networks	24CSCM43	2024-25
6	Data Communications and Computer Networks Lab	24CSCM43P	2024-25

Levels of Bloom's Taxonomy

Level-1	**Knowledge/Remember**
Level-2	**Understand**
Level-3	**Application**
Level-4	**Analyze**
Level-5	**Evaluation**
Level-6	**Create**



Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-I

Course Code: 24BSPM11

Title : ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Theory **Credits: 4** **5 hrs/week**

Course Objective:

- The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences.
- The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

Learning outcomes:

Course outcomes – Mapping with Blooms Taxonomy levels	
CO1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.	Level-3 , Level-6
CO2. To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations	Level-1 , Level-2
CO3. To Explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life	Level-1 , Level-2
CO4. Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.	Level-1 , Level-2

CO5. To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.	Level-4, Level-5

CO-PO Mapping
1- Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	2	-	1	-	-	-	3	1	3	3
CO 2	2	-	2	2	-	2	3	1	3	3
CO 3	2	-	2	2	-	2	3	1	3	3
CO 4	2	1	2	2	-	2	3	1	3	3
CO 5	1	1	3	2	3	2	3	2	3	3

CO-PSO Mapping
1- Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	1	1	2
CO 2	2	1	1	1	2
CO 3	2	2	1	1	1
CO 4	2	2	1	1	1
CO 5	3	3	3	3	3

SYLLUBUS

UNIT-I

ESSENTIALS OF MATHEMATICS

Complex Numbers: Introduction of the new symbol (i) – General form of a complex number – Modulus- Amplitude form and conversions.

Trigonometric Ratios: Trigonometric Ratios and their relations – Problems on calculation of angles.

Vectors: Definition of vector addition – Cartesian form – Scalar and vector product and problems.

Statistical Measures: Mean, Median, Mode of a data and problems. **Graphical representation of data.** Bar graphs, histograms of uniform width and of varying widths

UNIT- II

ESSENTIALS OF PHYSICS

Definition and Scope of Physics- Measurements and Units.

Motion of objects: Newtonian mechanics and relativistic mechanics perspective.

Laws of Thermodynamics and Significance. Entropy.

Difference between Acoustic waves and electromagnetic waves and their properties.

Electric and Magnetic fields and their interactions.

Behaviour of atomic and nuclear particles.

Wave-particle duality, the uncertainty principle. Introduction to quantum theory.

Theories and understanding of universe.

UNIT -III

ESSENTIALS OF CHEMISTRY

Definition and Scope of Chemistry- Importance of Chemistry in daily life - Branches of chemistry and significance- Periodic Table- atomic models. Electronic Configuration, chemical changes, classification of matter, Biomolecules- carbohydrates, proteins, fats and vitamins.

UNIT IV:

APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

Applications of Mathematics in Physics & Chemistry: Calculus, Differential Equations & Complex Analysis. Integrations and basic formulas.

Application of Physics in Industry and Technology: Electronics and Semiconductor Industry, Robotics and Automation, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.

Application of Chemistry in Industry and Technology: Chemical Manufacturing, Pharmaceuticals and Drug Discovery, synthesising of Nano-materials, Food and Beverage Industry. Food preservation techniques.

UNIT-V

ESSENTIALS OF COMPUTER SCIENCE

Milestones of computer evolution - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications. Basic types operating systems.

Ethical and social implications: cyber security - Information Assurance Fundamentals, Cryptography-Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques- Privacy and Data Protection.

Recommended books:

1. Functions of one complex variable by John.B.Conway, Springer-Verlag.
2. Elementary Trigonometry by H.S.Hall and S.R.Knight
3. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd.
4. Basic Statistics by B.L.Agarwal, New age international Publishers
5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
6. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker
7. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway and John W. Jewett Jr.
8. Physics for Technology and Engineering" by John Bird
9. Chemistry in daily life by Kirpal Singh
10. Chemistry of bio molecules by S. P. Bhutan
11. Fundamentals of Computers by V. Raja Raman
12. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

STUDENT ACTIVITIES

UNIT I: ESSENTIALS OF MATHEMATICS

1: Complex Number Exploration

Provide students with a set of complex numbers in both rectangular and polar forms.

They will plot the complex numbers on the complex plane and identify their properties

2: Trigonometric Ratios Problem Solving

Give students a set of problems that require the calculation of trigonometric ratios and their relations.

Students will solve the problems using the appropriate trigonometric functions (sine, cosine, tangent, etc.) and trigonometric identities.

3: Vector Operations and Applications

Provide students with a set of vectors in Cartesian form.

Students will perform vector addition and subtraction operations to find the resultant vectors.

They will also calculate the scalar and vector products of given vectors.

4: Statistical Measures and Data Analysis

Give students a dataset containing numerical values.

Students will calculate the mean, median, and mode of the data, as well as other statistical measures if appropriate (e.g., range, standard deviation).

They will interpret the results and analyse the central tendencies and distribution of the data.

UNIT II: ESSENTIALS OF PHYSICS

1. Concept Mapping: Divide students into groups and assign each group one of the topics. Students will create a concept map illustrating the key concepts, relationships, and applications related to their assigned topic. Encourage students to use visual elements, arrows, and labels to represent connections and interdependencies between concepts.

2. Laboratory Experiment. Select a laboratory experiment related to one of the topics, such as motion of objects or electric and magnetic fields. Provide the necessary materials, instructions, and safety guidelines for conducting the experiment.

   Students will work in small groups to carry out the experiment, collect data, and analyse the results.

   After the experiment, students will write a lab report summarizing their findings, observations, and conclusions.

UNIT III: ESSENTIALS OF CHEMISTRY

1: Chemistry in Daily Life Presentation

Divide students into groups and assign each group a specific aspect of daily life where chemistry plays a significant role, such as food and nutrition, household products, medicine, or environmental issues.

Students will research and create a presentation (e.g., PowerPoint, poster, or video) that showcases the importance of chemistry in their assigned aspect. 2: Periodic Table Exploration

Provide students with a copy of the periodic table.

Students will explore the periodic table and its significance in organizing elements based on their properties.

They will identify and analyse trends in atomic structure, such as electronic configuration, atomic size, and ionization energy.

3: Chemical Changes and Classification of Matter: Provide students with various substances and chemical reactions, such as mixing acids and bases or observing a combustion reaction. Students will observe and describe the chemical changes that occur, including changes in color, temperature, or the formation of new substances.

4: Biomolecules Investigation: Assign each student or group a specific biomolecule category, such as carbohydrates, proteins, fats, or vitamins. Students will research and gather information about their assigned biomolecule category, including its structure, functions, sources, and

importance in the human body. They can create informative posters or presentations to present their findings to the class.

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Interdisciplinary Case Studies

Divide students into small groups and provide them with interdisciplinary case studies that involve the interdisciplinary application of mathematics, physics, and chemistry.

Each case study should present a real-world problem or scenario that requires the integration of concepts from all three disciplines.

2: Design and Innovation Project

Challenge students to design and develop a practical solution or innovation that integrates mathematics, physics, and chemistry principles.

Students can choose a specific problem or area of interest, such as renewable energy, environmental conservation, or materials science. 3: Laboratory Experiments

Assign students laboratory experiments that demonstrate the practical applications of mathematics, physics, and chemistry.

Examples include investigating the relationship between concentration and reaction rate, analysing the behaviour of electrical circuits, or measuring the properties of materials.

.4: Mathematical Modelling

Present students with real-world problems that require mathematical modelling and analysis.

UNIT V: ESSENTIALS OF COMPUTER SCIENCE

1. Identifying the attributes of network (Topology, service provider, IP address and bandwidth of
2. Your college network) and prepare a report covering network architecture.

3. Identify the types of malwares and required firewalls to provide security.

4. Latest Fraud techniques used by hackers.

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-I

COURSE Code: 24BPM11
Title: ESSENTIALS IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Model Paper

Max Marks: 60

Part –A

Answer the following multiple choice Questions with suitable choices (20×1=20 M)

1. Analyzing rates os change in related quantities
   a)modeling population growth b)solving related rates problems
   c)Heat conduction in a rod d)finding maximum or minimum of a function
2. in a right –angled triangle ,the tangent of an angle is equal is equal to
   a)opposite hypotenuse b)adjacent/hypotenuse c)opposite/adjacent
   d)hypotenuse/opposite
3. Newton's first law of motion states that an object will remain at rest or in uniform motion
   unless acted upon by a.
   a)force b) velocity c) mass d) acceleration
4. Which law of thermodynamics states that energy cannot be created or destroyed , only transferred
   or converted from one from to another?
   a)zeroth law b) first law c) second law d) third law
5. what type of wave is an acoustic wave ?
   a) Longitudinal wave b) transverse wave c) electromagnetic wave d)standing wave
6. what is the primary function of a semiconductor in electronic devices?
   a)to amplify signals b)to store data c)to generate power d)to control mechanical systems
7. basic principle of optical fiber ?
   a)Absorbing b)refraction c) total internal reflection d)interference
8. In the context of integrated circuits what does CMOS stand for ?
   a)current mode operational systems b) circuit miniaturization and optimization systems
   c)complementary metal- oxide semi conductor d)continuous modulation of signals
9. what is the definition of chemistry ?
   a) the study of living organisms b) the study of matter and its properties

c)the study of celestial bodies d) the study of historical events

10. which household item contains acetic acid ?
a)baking soda b) vinegar c) salt d) lemon juice

11. what is the general formula of a carbohydrate ?
a)CnH2n+2 b)CnH2n c) CnH2n2 d)CnH2no

12. what is the conjugate of the complex number 3+4i?
a)3-4i b)-3+4i c)-3-4i d)3-i

13. Describing the charging or discharging of a capacitor
a) modeling population growth b)leat condution in a rod
c)solving related rates peoblems d)RC circuit analysis

14. if sin(ø)= 3/5, what is the value of cos(ø)in the same triangle?
a)3/5 b)5/2 c)2/5 d)5/4

15. for the set of dain {4,8,2,6,2,10}, what is the mean ?
a)5 b)6 c) 5.2 d) 8

16. which of the following is a fibrous prote in found in hair and nails
a)insulin b)collagen c) hemoglobin d) myoglobin

17. what is the primary purpose of quenching in material science /
a) increase hardness b)improve ductility c) enhance conductivity d)reduce density

18. who Build the first Digital computer?
a)William oughtred b) Charles babbage c)blaise pascal d)gattfried von leibenitz

19.Which is called as globel collection of computer networks?
a)internet b)TCP c) Router d) FTP

20. M- commerce is an acronym for ?
a)MAN commerce b) mobile commerce c) monthly commerce d) memo commerce

PART-B

21. The _____of a complex number a+bi is a

22. The rate of change in displacement is_____

23. Avogadro's number represents the number_____ in one mole of a substance.

24. The process of converting unsaturated fats into saturated fats by adding hydrogen is called

_____

25. Calculate the number of moles in 25 grams of water (11_2O).

26. In _____was the hallmark of third generation of Computers ar

27._____invented Mechanical calculating Machine

28 . Expand DARPA_____

29. An electric current flowing through a conductor creates a_____

30. The wavelength (μ) of a particle is inversely proportional to its_____

PART-C

Write Very Short Answers for the following Questions (10×1=10 M)

31. Explain the concept of entropy in the context of the Second Law of Thermodynamics, choulie 201
32. Define Molality (m).
33. Name a fat-soluble vitamin
34. Name a table sugar.
35. Define the imaginary unit i.
36. What is the dot product of vectors p=2+3j-k and q=-i-2j-3k?
37.How does the integration of artificial intelligence impact the electronics industry?
38. What is a Software Program that Attaches itself to other software programs
39. E-Mail, E-Commerce, Chatting, and Newsgroup are Applications of?
40. What is the Relative High Speed of LAN?

PART-D

Match the following Group-A with Most suitable words Group-B (10×1=10 M)

41.Proton	[ ]	A)the real transfer takes place
42. Ohm's Lan	[ ]	B)intense service provider
43. Ghycogen	[ ]	C) Electrical. Conductivity
44. ISP	[ ]	D). Vacunam Tubes
45 First Generation	[ ]	E). Mixture of gases
46. Homogeneous mixture	[ ]	F) Glucose
47. a.b	[ ]	G) Middle value:
48. Median	[ ]	H) Dot product
49, a+ bi	[ ]	i). Positively charged subatomic particle
50. Adiabatic Process	[ ]	J). Complex number

PART-E

State the below statements are True(or)False. v(10×1=10 M)

51 The mode is always a measure of central tendency.
52. According to Newton's Second Law, the acceleration of an object is inversely proportional to the net force acting on it.
53. Fiber optic cables are not affected by electromagnetie interfenance

54. The production of soap involves a chemical process Known as specification
55. In the food industry, the Millard reactions responsible for the browsing of bread wrest and the development of flavors in roasted coffee.
56. ARTEL 85% MTNL and RELIANCE are seaples of Networks
57.LAN stands Legal Area Internet
58. The internet is not a global collection of computer networks
59. The tangent of an angle is equal to the cotangent of its complementary angle.
60. The product of two imaginary units is a real number

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-I

Course Code: 24BPM12
Title: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Hours: 5 hrs/week Credits: 4

Course Objective:

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences. The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contributeto scientific advancements.

Course outcomes – Mapping with Blooms Taxonomy levels	
CO1. Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.	Level-3 , Level-6
CO2. To Explain the basic principles and concepts underlying a broad range of fundamental areasof physics and to Connect their knowledge of physics to everyday situations.	Level-1 , Level-2
CO3. Understand the different sources of renewable energy and their generation processes and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.	Level-1 , Level-2
CO4. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health.	Level-1 , Level-2

CO5. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used	Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	1	-	-	-	3	1	3	2
CO 2	2	-	2	2	-	2	3	1	3	2
CO 3	2	-	2	2	-	2	3	1	3	1
CO 4	2	1	2	2	-	2	3	1	3	3
CO 5	1	1	3	2	3	2	3	2	3	2

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	2	2	2	2
CO 2	2	2	1	1	1
CO 3	2	2	1	1	2
CO 4	2	2	1	1	2
CO 5	3	3	3	3	3

SYLLUBUS

UNIT I: ADVANCES IN BASICS MATHEMATICS 9hrs

Straight Lines: Different forms – Reduction of general equation into various forms –Point of intersection of two straight lines

Limits and Differentiation: Standard limits – Derivative of a function – Problems on product rule and quotient rule

Integration: Integration as a reverse process of differentiation – Basic methods of integration

Matrices: Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose of a matrix and determinants

UNIT II: ADVANCES IN PHYSICS: 9hrs

Renewable energy: Generation, energy storage, and energy-efficient materials and devices. Recent advances in the field of nanotechnology: Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

UNIT III: ADVANCES IN CHEMISTRY: 9hrs

Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method.

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY 9hrs

Mathematical Modelling applications in physics and chemistry Application of Renewable energy: Grid Integration and Smart Grids, Application of nanotechnology: Nanomedicine,

Application of biophysics: Biophysical Imaging, Biomechanics, Neurophysics,

Application of medical physics: Radiation Therapy, Nuclear medicine

Solid waste management, Environmental remediation- Green Technology, Water treatment.

UNIT V: Advanced Applications of computer Science 9hrs

Number System-Binary, Octal, decimal, and Hexadecimal, Signals-Analog, Digital, Modem, Codec, Multiplexing, Transmission media, error detection and correction- Parity check and CRC, Networking devices- Repeater, hub, bridge, switch, router, gateway.

Recommended books:

1. Coordinate Geometry by S.L.Lony, Arihant Publications

2. Calculus by Thomas and Finny, Pearson Publications

3. Matrices by A.R.Vasishtha and A.K.Vasishtha, Krishna Prakashan Media(P)Ltd.

4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle

5. "Energy Storage: A Nontechnical Guide" by Richard Baxter

6. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A. Bohara

7. "Biophysics: An Introduction" by Rodney Cotterill

8. "Medical Physics: Imaging" by James G. Webster

9. "Shape Memory Alloys: Properties and Applications" by Dimitris C. Lagoudas

10. Nano materials and applications by M.N.Borah

11. Environmental Chemistry by Anil.K.D.E.

12. Digital Logic Design by Morris Mano

13. Data Communication & Networking by Bahrouz Forouzan.

STUDENT ACTIVITIES

UNIT I: ADVANCES IN BASIC MATHEMATICS

1: Straight Lines Exploration

Provide students with a set of equations representing straight lines in different forms, such as slope-intercept form, point-slope form, or general form.

Students will explore the properties and characteristics of straight lines, including their slopes, intercepts, and point of intersection.

2: Limits and Differentiation Problem Solving

Students will apply the concept of limits to solve various problems using standard limits.

Encourage students to interpret the results and make connections to real-world applications, such as analyzing rates of change or optimizing functions.

3: Integration Exploration

Students will explore the concept of integration as a reverse process of differentiation and apply basic methods of integration, such as the product rule, substitution method, or

integration by parts.

Students can discuss the significance of integration in various fields, such as physics and chemistry

4: Matrices Manipulation

Students will perform operations on matrices, including scalar multiplication, matrix multiplication, and matrix transpose.

Students can apply their knowledge of matrices to real-world applications, such as solving systems of equations or representing transformations in geometry.

UNIT II: ADVANCES IN PHYSICS:

1: Case Studies

Provide students with real-world case studies related to renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials.

Students will analyze the case studies, identify the challenges or problems presented, and propose innovative solutions based on the recent advances in the respective field.

They will consider factors such as energy generation, energy storage, efficiency,

sustainability, materials design, biomedical applications, or technological advancements.

2: Experimental Design

Assign students to design and conduct experiments related to one of the topics: renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials.

They will identify a specific research question or problem to investigate and design an experiment accordingly.

Students will collect and analyze data, interpret the results, and draw conclusions based on their findings.

They will discuss the implications of their experimental results in the context of recent advances in the field.

3: Group Discussion and Debate

Organize a group discussion or debate session where students will discuss the ethical, social, and environmental implications of the recent advances in renewable energy, nanotechnology, biophysics, medical physics, and shape memory materials.

Assign students specific roles, such as proponent, opponent, or moderator, and provide them with key points and arguments to support their positions.

UNIT III: ADVANCES IN CHEMISTRY:

Experimental Design and Simulation

In small groups, students will design experiments or simulations related to the assigned topic.

For example, in the context of computer-aided drug design, students could design a virtual screening experiment to identify potential drug candidates for a specific disease target.

For nano sensors, students could design an experiment to demonstrate the sensitivity and selectivity of nano sensors in detecting specific analytes.

Chemical biology-related activities could involve designing experiments to study enzyme- substrate interactions or molecular interactions in biological systems.

Students will perform their experiments or simulations, collect data, analyze the results, and draw conclusions based on their findings.

Case Studies and Discussion

Provide students with real-world case studies related to the impact of chemical pollutants on ecosystems and human health.

Students will analyze the case studies, identify the sources and effects of chemical pollutants, and propose mitigation strategies to minimize their impact.

Encourage discussions on the ethical and environmental considerations when dealing with chemical pollutants.

For the dye removal using the catalysis method, students can explore case studies where catalytic processes are used to degrade or remove dyes from wastewater.

Students will discuss the principles of catalysis, the advantages and limitations of the catalysis method, and its applications in environmental remediation.

3: Group Project

Assign students to work in groups to develop a project related to one of the topics.

The project could involve designing a computer-aided drug delivery system, developing a nano sensor for a specific application, or proposing strategies to mitigate the impact of chemical pollutants on ecosystems.

Students will develop a detailed project plan, conduct experiments or simulations, analyze data, and present their findings and recommendations.

Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Mathematical Modelling Experiment

Provide students with a mathematical modelling experiment related to one of the topics. For example, in the context of renewable energy, students can

develop a mathematical model to optimize the placement and configuration of solar panels in a solar farm.

Students will work in teams to design and conduct the experiment, collect data, and analyze the results using mathematical models and statistical techniques.

They will discuss the accuracy and limitations of their model, propose improvements, and

interpret the implications of their findings in the context of renewable energy or the specific application area.

2: Case Studies and Group Discussions

Assign students to analyze case studies related to the applications of mathematical modelling in nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment.

Students will discuss the mathematical models and computational methods used in the case studies, analyze the outcomes, and evaluate the effectiveness of the modelling approach.

Encourage group discussions on the challenges, ethical considerations, and potential advancements in the field.

Students will present their findings and engage in critical discussions on the advantages and limitations of mathematical modelling in solving complex problems in these areas.

Group Project

Assign students to work in groups to develop a group project that integrates mathematical modelling with one of the application areas: renewable energy, nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment.

The project could involve developing a mathematical model to optimize the delivery of radiation therapy in medical physics or designing a mathematical model to optimize waste management practices.

Students will plan and execute their project, apply mathematical modelling techniques, analyze the results, and present their findings and recommendations.

Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT V: Advanced Applications of computer Science

Students must be able to convert numbers from other number system to binary number systems

Identify the networking media used for your college network

Identify all the networking devices used in your college premises.

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-I

COURSE Code: 24BPM12
Title : ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Model Paper

Max Marks: 60

SECTION-A
(MULTIPLE CHOICE QUESTIONS)

1.Two lines with slopes m1 & m2 are perpendicular to each other if [ ]
A. m1= m2 B. m1+m2=1
C. m1m2=1 D. m1m2= -1

2. $\lim_{x\to 4} \frac{x^2-1}{x-4}$ = [ ]
A. 2 B. 4 C. 8 D. undefined

3.What is the standard form of LNG? [ ]
A. Liquefied Natural GasB. Liquefied Nuclear Gas
C. Liquefied Natural or Nuclear Gas D.None of the above

4. Which one of the following damages the ozone layer? [ ]
A. CFCSB. AerosolsC. Freons D. All of the above

5.. In which era CADD molecular biology started? [ ]
A. 1890 B. 1795
C. 1980D. 1675

6. In which year the GIT developed the first nanosensor? [ ]
A.1888 B. 1988 C. 1788 D. 1999

7.Which mathematical concept is the basis for error-correcting codes used in Computer Science ? [ ]
A.Group theory B. Probability theory
C. Game theory D. Differential Equations

8. In which one of the following nanomaterials quantum confinement occurs in two directions? []

A. One dimensional B.Two dimensional
C.Three dimensional D.Zero dimensional

9. Which of the following number system is known as base-10 system. [ ]

A.Binary Number System B.Hexadecimal Number System
C.Octal Number System D.Decimal Number System

10. Which one of the following network devices stores the IP addresses? [ ]

A.Router B.Switch
C.Both A and B D.None of the above

11. In what ratio the x-axis divide the line segment joining the points (2,-3) and (5,6)[ ]

A. 1:2 B. 2:1
C. 1:3 D. None of these

12. If the matrices $\begin{bmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{bmatrix} = \begin{bmatrix} 5 & y-2 \\ 8 & 4 \end{bmatrix}$ then the values of x and y are [ ]

A. x=-1/3, y=7 B. x=-1/3, y=-2/3
C. x=-2/3, y=7 D. x=5, y=-2/3

13.The measurement range of small angle X-ray scattering is around _____ meters? [ ]

A.5 nm B. 5-500 m
C. 20 m D.12 mm

14.The carbon nanotubes, graphene, and fullerenes are the _____ based nanoparticles? [ ]

A. Organic B. Inorganic
C. Carbon based D. None of the above

15. Expand QSARs [ ]

A. Quantitative structure activity relationship
B. Quality strong applicable relationship
C. Quality strengthen affordable ratio
D. Quantitative sorted affinity refund

16. In which drug design structure of the target protein is known? [ ]

A. SBDD B. CBDD
C. QSAR D. GIT

17.Which of the tool is used to find favorable bioactive compounds? [ ]

A. Virtual screening B. QSAR
C. CADD D. None of the above

18.What is the primary focus of Biophysics? [ ]
A.The study of living organisms' behavior
B.The study of the physical properties of living organisms
C.The study of the chemical reactions in living organisms
D.The study of the genetics of living organisms

19. Binary equivalent of decimal number 65 is [ ]
A.1000001 B.1000000
C.1000011 D.100001

20. What is the name for converting digital signal to analog signal? [ ]
A.Modulation B.Demodulation
C.Bypass D.Encapsulation

21. If y=log(tanx), then dy/dx is [ ]
a) $\frac{1}{tanx}$ b) $\frac{sec^2x}{tanx}$ c) $-sec^2x$ d) 0

22. $\lim_{x\to 1}\frac{x^{15}-1}{x^{10}-1}=$ [ ]
A. 3/2 B. 5/2 C. 1/2 D.. 7/2

23. How does Biophysics contribute to the field of neuroscience? [ ]
A.By studying the social behavior of organisms
B.By developing new brain imaging techniques
C.By analyzing the genetic basis of neurological disorders
D. By studying the electrical signaling in neurons

24.The forces acting on a runner near the end of a race are [ ]
A.Weight B.friction
C. Air resistance D.all the above.

SECTION-B
(FILL IN THE BLANKS)

25. $\int 10^{5x}\, dx =$

26. The line which cuts off equal intercepts from the axes and pass through the point (1, -2) is_____

27. Standard form of CNT is —----------++

28. The ratio of the surface of the collector receiving light divided by the total surface of the collector is known as _____

29. Full form of CADD_____

30._____ developed the first nanosensor.

31._____ chemical cause cancer and heart disease as well as infertility in human being.

32. Radiosotope used for estimation of plasma volume is _____

SECTION-C
(VERY SHORT ANSWERS)

33. Find the equation of the straight line cutting off an intercept 3 from the negative direction of the y-axis and inclined at 60˚ to the axis of x

34. Evaluate $\int e^x(1+x^2)dx$

35. what is Quantum Key distribution

36.How does Biophysics contribute to the field of medical imaging?

37. What is chemical biology ?

38. State chemical pollution ?

39. If x = -9 is a root of $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, , then find the other roots?

40. What is the standard form of NOMFET?

SECTION-D
(MATCH THE FOLLOWING)

41.Intercept form of a straight-line in all directions — A)Quantum Confinement

42. Mathematical modeling for rate of chemical reaction — B) Brain and spinal cord

43. Zeo dimension — C)Network Device

44. Central Nervous system — D) Dye removal

45. LBDD — E) Arrhenius Equation

66. Molecular docking methods — F) The Address of The Web Page

47. Nano sensors — G) $\frac{x}{a}+\frac{y}{b}=1$

48. $\int \frac{f'(x)}{f(x)}dx =$ — H) affinity and virtual screening

49.HUB design — I) ligand based drug

50.URL — J) log $|f(x|+C$

K) y=mx+c

L)$e^{f(x)}$

SECTION-E
(TRUE/FALSE)

51. If ɵ is the angle between two lines with slopes m_1 and m_2, then $tan\theta = \frac{m_1+m_2}{1+m_1m_2}$ [ ]

52. If A = $\begin{bmatrix}1 & -1\\ 2 & -1\end{bmatrix}$, B = $\begin{bmatrix}1 & 1\\ 1 & -1\end{bmatrix}$, then $(A+B)^2 \neq A^2 + B^2$ [ ]

53. At memory Transfer temperature a shape memory alloy return to its original shape [ ]

54. Radiation kills fast-growing cells in the area of treatment [ ]

55. Carbon nanotubes, quantum dots,etc are examples of nano sensors [ ]

56. Bisphenol A (BPA) is an extremely harmful chemical. [ ]

57. Mining, agriculture and waste disposal doesn't cause any pollution [ ]

58. The high temperature phase in shape memory effect is Martensite [ ]

59. A hub connects two different LANs. [ ]

60.The computer network that began the internet was called ARPAN [ ]

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-II

Course Code: 24CSCM21
Title: Problem Solving using C

Hours: 3 hrs/week **Credits: 3**

Course Objectives

1. To explore basic knowledge on computers
2. Learn how to solve common types of computing problems.
3. Learn to map problems to programming features of C.
4. Learn to write good portable C programs.

Course Outcomes

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Understand the working of a digital computer and Fundamental constructs of Programming	Level-1, Level-2
CO2. Analyze and develop a solution to a given problem with suitable control structures	Level-1, Level-2, Level-3
CO3. Apply the derived data types in program solutions	Level-2, Level-3
CO4. Use the 'C' language constructs in the right way	Level-3, Level-4, Level-5
CO5. Apply the Dynamic Memory Management for effective memory utilization	Level-3, Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	-	-	1	-	3	3	3	3
CO 2	2	-	-	-	1	-	3	3	3	3
CO 3	3	-	-	-	1	-	3	3	3	3
CO 4	3	-	-	-	1	-	3	3	3	3
CO 5	3	-	-	-	1	-	3	3	3	3

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

Syllabus

UNIT-I

Introduction to computer and programming: Introduction, Basic block diagram and functions of various components of computer, Concepts of Hardware and software, Types of software, Compiler and interpreter, , Flowcharts and Algorithms

Fundamentals of C: History of C, Features of C, C Tokens-variables and keywords and identifiers, constants and Data types, Rules for constructing variable names, Operators, Structure of C program, Input /output statements in C

UNIT-II

Control statements: Decision making statements: if, if else, else if ladder, switch statements. Loop control statements: while loop, for loop and do-while loop. Jump Control statements: break, continue

UNIT-III

Derived data types in C: Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation.

Strings: Declaring & initializing string variables; String handling functions,

UNIT-IV

Functions: Function Prototype, definition and calling. Return statement. Nesting of functions. Categories of functions. Recursion, Parameter Passing by address & by value. Local and Global variables. **Storage classes**: automatic, external, static and register.

Pointers: Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic. Pointers and arrays, pointers and functions.

UNIT-V

Dynamic Memory Management: Introduction, Functions-malloc, calloc, realloc, free **Structures:** Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers. **Unions** - Union definition; difference between Structures and Unions. **Files:** Introduction, File Operations.

Text Books:

1. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, 6th Edn, ISBN-13: 978- 1- 25- 90046-2

2. Herbert Schildt, ―Complete Reference with C, Tata McGraw Hill, 4th Edn., ISBN- 13: 9780070411838, 2000

3. Computer fundamentals and programming in C, REEMA THAREJA, OXFORD UNIVERSITY PRESS

Reference Books

1. E Balagurusamy, COMPUTING FUNDAMENTALS & C PROGRAMMING – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.

2. Ashok N Kamthane, Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.

3. Henry Mullish&Huubert L.Cooper: The Spirit of C An Introduction to modern Programming, Jaico Pub. House,1996.

4. Y kanithkar, let us C BPB, 13 th edition-2013, ISBN:978-8183331630,656 pages.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Quiz on computer hardware and software concepts

Evaluation Method: Objective-based quiz assessing knowledge and understanding

Unit 2: Activity: Problem-solving using Decision-Making Statements

Evaluation Method: Correctness of decision-making logic

Unit 3: Activity: Array and String Program Debugging

Evaluation Method: Identification and correction of errors in code

Unit 4: Activity: Pair Programming Exercise on Functions

Evaluation Method: Collaboration and Code Quality

Unit 5: Activity: Structured Programming Assignment

Evaluation Method: Appropriate use of structures and nested structures

II Semester

Course Code: 24CSCM21P

Title: Problem Solving using C Lab

Hours: 2hr/Week **Credits -1**

List of Experiments

1. Write a program to calculate simple & compound interest.
2. Find the biggest of three numbers using C.
3. Write a c program to find the sum of individual digits of a positive integer.
4. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
5. Write a c program to check whether a number is Armstrong or not.
6. Write a c program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7. Write a c program that implements searching of given item in given list
8. Write a c program that uses functions to perform the following: Addition of two matrices. Multiplication of two matrices.
9. Write a program for concatenation of two strings.
10. Write a program for length of a string with and without String Handling functions
11. Write a program to demonstrate Call by Value and Call by Reference mechanism
12. Write a Program to find GCD of Two numbers using Recursion
13. Write a c program to perform various operations using pointers.
14. Write a c program to read data of 10 employees with a structure of 1.employee id 2.aadar no, 3.title, 4.joined date, 5.salary, 6.date of birth, 7.gender, 8.department.
15. Write a Program to demonstrate dynamic arrays using Dynamic Memory Management functions.

SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- II
Programme : B.Sc(Computer Science) – Honours

Course title: Problem Solving Using C

Course code: 24CSCM21

Time: 3 hours **Maximum Marks: 60**

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. What is software? Describe various types of software.
2. What is an identifier? Describe various rules for constructing identifier names.
3. Write a C program to illustrate Switch Case statement.
4. Describe various jump control statements
5. Write a C program to find minimum and maximum element of an integer array.
6. Describe various storage classes
7. Differentiate between structure and union
8. Explain various dynamic memory allocation functions.

PART- B

Answer **all the following** questions.
Each carries **Eight** marks 5 X 8 = 40 Marks

9 (A) What is computer? Describe the block diagram of computer with a neat sketch.

(OR)

(B) What is operator? Explain various types of operators.

10 (A) Explain various two way decision making statements in C with examples.

(OR)

(B) Explain various iterative statements in C with examples.

11 (A) Define array. Explain declaration, initialization and memory representation of one dimensional array.

(OR)

(B) Write a C program to find the product of two matrices

12 (A) Explain various types of functions based on parameters and return values with suitable examples.

(OR)

(B). What is pointer? Explain Pointer declaration, initialization, accessing values using pointers.

13 (A) What is structure? Describe the procedure to create structure, accessing structure members with example.

.

(OR)

(B). Describe various methods to pass structure as function arguments with example.

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B.Sc(Computer Science) Honours , Year : I, Semester : II

Paper code: 23CSCM21 Paper title: Problem Solving using C

Unit I:

1. What is computer? Describe the block diagram of computer with a neat sketch.
2. Define software. Explain various types of software.
3. Explain Machine Level, Assembly Level and High level programming languages.
4. What is an algorithm? Explain various properties of algorithm.
5. Write an algorithm to find roots of quadratic equation.
6. What is flow chart? Describe various symbols used to draw flow chart.
7. Draw a flow chart to find largest among three numbers.
8. What is C programming? Explain various features of C.
9. Explain structure of C program with an example.
10. What is an identifier? Describe various rules for constructing identifiers names.
11. Describe basic data types in C.
12. What is operator? Explain various types of operators.

Unit-II:

1. Explain various two way decision making statements.
2. Write a c program to illustrate else if ladder.
3. Write a C program to illustrate switch case statement.
4. Explain various iterative statements in C.
5. Write a C program to check given number is Armstrong or not.
6. Describe various jump control statements.

Unit- III:

1. Define array. Explain declaration, initialization and memory representation of one dimensional array.
2. Write a C program to read and display the 1D array.

3. Write a C program to find minimum and maximum element of an integer array.
4. Explain declaration, initialization and memory representation of Two dimensional array.
5. Write a C program to find the sum of two matrices.
6. Write a C program to find the product of two matrices.
7. Explain various string handling functions.
8. What is string? How to declare and initialize string variables.

Unit-IV

1. What is function? Write the advantages of functions.
2. Explain function prototype, definition and calling with an example.
3. Explain various types of functions based on parameters and return values.
4. Explain about recursive functions with example.
5. Explain parameter passing mechanisms.
6. Describe various storage classes.
7. What is pointer? Explain Pointer declaration, initialization, accessing values using pointers.
8. Explain pointers and functions.

Unit- V

1. Explain various dynamic memory allocation functions.
2. What is structure? Describe the procedure to create structure, accessing structure members with example.
3. Explain structures and functions.
4. Explain structure and pointers.
5. Differentiate between structure and union.

Programme: B.Sc. Honors in Computer Science (Major) 2024-2025

SEMESTER-II

Course Code: 24CSCM22 Title: Digital Logic Design

Hours: 3 hrs/week **Credits: 3**

Course Objectives

To familiarize with the concepts of designing digital circuits.

Course Outcomes

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Understand how to Convert numbers from one radix to another radix and perform arithmetic operations.	Level-1, Level-2
CO2. . Simplify Boolean functions using Boolean algebra and k- maps	Level-1, Level-2, Level-3
CO3. Design adders and subtractors circuits	Level-2, Level-3
CO4. Design combinational logic circuits such as decoders, encoders, multiplexers and demultiplexers.	Level-3, Level-4, Level-5
CO5. Use flip flops to design registers and counters.	Level-3, Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	-	-	1	-	3	3	3	3
CO 2	2	-	-	-	1	-	3	3	3	3
CO 3	3	-	-	-	1	-	3	3	3	3
CO 4	3	-	-	-	1	-	3	3	3	3
CO 5	3	-	-	-	1	-	3	3	3	3

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT – I

Number Systems: Binary, octal, decimal, hexadecimal number systems, conversion of numbers from one radix to another radix, r's, (r-1)'s complements, signed binary numbers, addition and subtraction of unsigned and signed numbers.

UNIT – II

Logic Gates and Boolean Algebra: NOT, AND, OR, universal gates, X-OR and X-NOR gates, Boolean laws and theorems, complement and dual of a logic function, canonical and standard forms, two level realization of logic functions using universal gates, minimizations of logic functions (POS and SOP) using Boolean theorems, K-map (up to four variables), don't care conditions.

UNIT – III

Combinational Logic Circuits – 1: Design of half adder, full adder, half subtractor, full subtractor, ripple adders and subtractors.

UNIT – IV

Combinational Logic Circuits – 2: Design of decoders, encoders, priority encoder, multiplexers, demultiplexers, realization of Boolean functions using decoders, multiplexers.

UNIT – V

Sequential Logic Circuits: Classification of sequential circuits, latch and flip-flop, RS-latch using NAND and NOR Gates, truth tables, RS, JK, T and D flip-flops, truth and excitation tables, conversion of flip- flops, flip-flops with asynchronous inputs (preset and clear).

Design of registers, shift registers, bidirectional shift registers, universal shift register.

Text Books:

1. M. Morris Mano, Michael D Ciletti, "Digital Design", 5th edition, PEA.

Reference Books

1. Kohavi, Jha, "Switching and Finite Automata Theory", 3rd edition, Cambridge.
2. 2. Leach, Malvino, Saha, "Digital Principles and Applications", 7th edition, TMH.
3. 3. Roth, "Fundamentals of Logic Design", 5th edition, Cengage.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: JAM (Just a Minute) Session: Explaining Radix Conversion

Evaluation Method: Communication Skills and Knowledge Presentation

Unit 2: Activity: Boolean Algebra Assignment

Evaluation Method: Assignment Completion and Correctness

Unit 3: Activity: Hands-on Lab Activity: Building Adder and Subtractor Circuits

Evaluation Method: Lab Performance and Correctness of Circuit Implementation

Unit 4: Activity: Group Discussion: Applications of Decoders, Encoders, Multiplexers

Evaluation Method: Participation and Critical Thinking

Unit 5: Activity: Quiz on Flip-Flops and Register-Counter Design
Evaluation Method: Quiz Performance and Knowledge Retention

II Semester

Course Code: 24CSCM22P

Title: Digital Logic Design Lab

Hours: 2hr/Week **Credits -1**

List of Experiments

The laboratory work can be done by using physical gates and necessary equipment or simulators.

Simulators: https://sourceforge.net/projects/gatesim/ or https://circuitverse.org/ or any free open- source simulator

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean functions using logic gates in both SOP and POS forms
3. Realization of basic gates using universal gates.
4. Design and implementation of half and full adder circuits using logic gates.
5. Design and implementation of half and full subtractor circuits using logic gates.
6. Verification of stable tables of RS, JK, T and D flip-flops using NAND gates.
7. Verification of stable tables of RS, JK, T and D flip-flops using NOR gates.
8. Implementation and verification of Decoder and encoder using logic gates.
9. Implementation of 4X1 MUX and DeMUX using logic gates.
10. Implementation of 8X1 MUX using suitable lower order MUX.
11. Implementation of 7-segment decoder circuit.
12. Implementation of 4-bit parallel adder.
13. Design and verification of 4-bit synchronous counter.
14. Design and verification of 4-bit asynchronous counter.

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SEMESTER END EXAMINATIONS MODEL PAPER

SEMESTER- II

Programme : B.Sc(Computer Science) – Honors

Course title: Digital Logic Design

Course code: 24CSCM22

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.

Each question carries **Four** marks. 5 X 4 = 20 Marks

1. Convert $(515.6875)_{10}$ into Binary and Octal number systems.
2. Using 2's Complement perform a) 1010100-1000011 b) 1000011-1010100 .
3. Define Boolean algebra. Describe various properties of Booleanalgebra
4. Express the Boolean function F = A + B'C as a sum of minterms
5. Explain half adder with a neat sketch.
6. Explain ripple subtarctor.
7. Explain classification of sequential circuits
8. Explain SR Latch

PART- B

Answer **all the following** questions.

Each carries **Eight** marks 5 X 8 = 40 Marks

9. (A) Explain various types of number systems in digital logic with suitable examples.

(OR)

(B) The solutions to the quadratic equation x2 - 11x + 22 = 0 are x = 3 and x = 6. What is the base of the numbers?

10. (A) Simplify the following Boolean function into (a) sum-of-products form and (b) product-of-sums form F (A, B, C, D) =∑ (0, 1, 2, 5, 8, 9, 10).

(OR)

(B) Implement the following Boolean function with NAND gates. F (x, y, z) = ∑ (1, 2, 3, 4, 5, 7)

11. (A) Explain full adder with a neat sketch.

(OR)

(B) Explain half subtractor and full subtractor

12.(A) Design 3 to 8 line decoder with a neat logic diagram.

(OR)

(B). Describe multiplexers and de multiplexers

13. (A) Describe various types of flip flops.. .

(OR)

(B). Explain 4-bit register with a neat sketch.

****

Question Bank

B.Sc(Computer Science) Honours , Year : I, Semester : II

Paper code: 23CSCM22 Paper title: Digital Logic Design

Unit I:

1. Convert (515.6875)10 into Binary and Octal number systems.
2. Convert (101100011010 11.111100000110)2 into Octal and hexa decimal systems.
3. Using 2's Complement perform a) 1010100-1000011 b) 1000011-1010100.
4. Explain about signed binary numbers.
5. Explain various types of number systems in digital logic with suitable examples.
6. The solutions to the quadratic equation x2 - 11x + 22 = 0 are x = 3 and x = 6. What is the base of the numbers?
7. Convert the following numbers with the indicated bases to decimal:

(a) (4310)5 (b) (198)12 (c) (435)8 (d) (345)6

8. Convert the hexadecimal number 64CD to binary, and then convert it from binary to octal.

Unit-II:

1. Describe basic logic gates with truth tables and draw logic diagrams.
2. Define Boolean algebra. Describe various properties of Boolean algebra.
3. List and prove DeMorgan's Thereoms.
4. Express the Boolean function F = A + B'C as a sum of minterms.
5. Express the Boolean function F = xy + x'z as a product of maxterms.
6. Simplify the Boolean function F (x, y, z) = Σ(0, 2, 4, 5, 6) using K-Map method.
7. Simplify the Boolean function F (w, x, y, z) = Σ (0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14) using KMap

method.

8. Simplify the following Boolean function into (a) sum-of-products form and (b) productof-

sums form

F (A, B, C, D) =Σ (0, 1, 2, 5, 8, 9, 10).

9. Simplify the Boolean function F (w, x, y, z) = Σ (1, 3, 7, 11, 15) which has the don't-care

conditions d (w, x, y, z) = Σ (0, 2, 5).

10. Implement the following Boolean function with NAND gates.

F (x, y, z) = Σ (1, 2, 3, 4, 5, 7)

Unit- III:

1. Explain the design process of half adder and full adder.
2. Draw the logic diagram to implement 4-bit binary adder and explain.
3. Explain half subtractor and full subtractor.
4. Explain ripple subtarctor.

Unit-IV

1. Design 3 to 8 line decoder with a neat logic diagram.
2. Design 4 to 16 decoder with two 3 to 8 decoders with a neat logic diagram.
3. Describe the procedure to implement full adder using decoder.
4. Explain encoders.
5. Explain priority encoders.
6. Describe multiplexers and de multiplexers.

Unit- V

1. Explain classification of sequential circuits.
2. Describe different latches.
3. Describe various types of flip flops.
4. Explain 4-bit register with a neat sketch.
5. Explain about shift registers.
6. Explain universal shift register.

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-III

Course Code: 24CSCM31
Title: Object Oriented Programming using Java

Hours: 3 hrs/week **Credits: 3**

Course Objectives

To introduce the fundamental concepts of Object-Oriented programming and to design & implement object-oriented programming concepts in Java.

Course Outcomes

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Understand the basic concepts of Object-Oriented Programming and Java Program Constructs	Level-1, Level-2
CO2. Implement classes and objects and analyze Inheritance and Dynamic Method Dispatch	Level-1, Level-2, Level-3
CO3. Demonstrate various classes in different packages and can design own packages	Level-2, Level-3
CO4. Manage Exceptions and Apply Threads	Level-3, Level-4, Level-5
CO5. Create GUI screens along with event handling	Level-3, Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	-	-	1	-	3	3	3	3
CO 2	2	-	-	-	1	-	3	3	3	3
CO 3	3	-	-	-	1	-	3	3	3	3
CO 4	3	-	-	-	1	-	3	3	3	3
CO 5	3	-	-	-	1	-	3	3	3	3

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT-I

OOPs Concepts and Java Programming: Introduction to Object-Oriented concepts, procedural and object-oriented programming paradigm

Java programming: An Overview of Java, Java Environment, Data types, Variables, constants, scope and life time of variables, operators, type conversion and casting, Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format(), Control Statements

UNIT-II

Arrays, Command Line Arguments, Strings-String Class Methods

Classes & Objects: Creating Classes, declaring objects, Methods, parameter passing, static fields and methods, Constructors, and 'this' keyword, overloading methods and access

Inheritance: Inheritance hierarchies, super and subclasses, member access rules, 'super' keyword, preventing inheritance: final classes and methods, the object class and its methods; **Polymorphism**: Dynamic binding, method overriding, abstract classes and methods;

UNIT-III

Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface;

Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, usage of try, catch, throw, throws and finally, rethrowing exceptions, built in exceptions, creating own exception sub classes.

UNIT-IV

Multithreading: Differences between multiple processes and multiple threads, thread states, thread life cycle, creating threads

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files,

UNIT-V

GUI Programming with Swing- Introduction, MVC architecture, components, containers.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events,

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

Reference Books

1. Cay S. Horstmann, “Core Java Fundamentals”, Volume 1, 11 th Edition, Prentice Hall, 2018.

2. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.

3. S. Malhotra, S. Chudhary, Programming in Java, 2nd edition, Oxford Univ. Press.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Quiz on Object-Oriented Programming Concepts and Java Constructs

Evaluation Method: Quiz Performance and Knowledge Retention

Unit 2: Activity: Object-Oriented Programming Assignment: Class Implementation

Evaluation Method: Assignment Completion and Correctness

Unit 3: Activity: Hands-on Lab Activity: Creating and Using Custom Java Packages

Evaluation Method: Lab Performance and Correctness of Code Implementation

Unit 4: Activity: Case Study Discussion on where multi-threading is crucial

Evaluation Method: Critical thinking, problem-solving, and presentation skills.

Unit 5: Activity: GUI design contest using Java Swings

Evaluation Method: GUI design, Visual appearance and user friendliness, usability, and adherence to event handling principles.

III Semester
Course Code: 24CSCM31P
Title: Object Oriented Programming using Java Lab
Credits -1

List of Experiments

1. Write a Java program to print Fibonacci series using for loop.
2. Write a Java program to calculate multiplication of 2 matrices.
3. Create a class Rectangle. The class has attributes length and width. It should have methods that calculate the perimeter and area of the rectangle. It should have read Attributes method to read length and width from user.
4. Write a Java program that implements method overloading.
5. Write a Java program for sorting a given list of names in ascending order.
6. Write a Java program that displays the number of characters, lines and words in a text file.
7. Write a Java program to implement various types of inheritance i. Single ii. Multi-Level iii. Hierarchical iv. Hybrid
8. Write a java program to implement runtime polymorphism.
9. Write a Java program which accepts withdraw amount from the user and throws an exception “In Sufficient Funds” when withdraw amount more than available amount.
10. Write a Java program to create three threads and that displays “good morning”, for every one second, “hello” for every 2 seconds and “welcome” for every 3 seconds by using extending Thread class.
11. Write a Java program that creates three threads. First thread displays “OOPS”, the second thread displays “Through” and the third thread Displays “JAVA” by using Runnable interface.
12. Implement a Java program for handling mouse events when the mouse entered, exited, clicked, pressed, released, dragged and moved in the client area.

13. Implement a Java program for handling key events when the key board is pressed, released, typed.

14. Write a Java swing program that reads two numbers from two separate text fields and display sum of two numbers in third text field when button “add” is pressed.

15. Write a Java program to design student registration form using Swing Controls. The form which having the following fields and button SAVE

Form Fields are: Name, RNO, Mailid, Gender, Branch, Address

SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- II
Programme : B.Sc(Computer Science) – Honors
Course title: Object Oriented Programming using Java
Course code_ 24CSCM31

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. Explain JVM.
2. Explain about data types in java.
3. Write about constructor with an example program.
4. Explain inheritance with an example program.
5. Define Abstract class and Abstract methods.
6. Explain packages in java.
7. Explain MVC Architecture.
8. Describe about event listeners

PART- B

Answer **all the following** questions.
Each carries **Eight** marks 5 X 8 = 40 Marks

9. a) Explain about various types if-statements with example.

(OR)

b) Write about operators in java?

10 a) Explain about overriding and overloading methods with example program.

(OR)

b) Explain how to create classes, objects and methods with example program.

11 a) Explain about exception handling mechanism.

(OR)

b) What is an Interface? How to implement multiple inheritance using an interfaces?

.

12 a) Explain about byte streams.

(OR)

b) Discuss thread life cycle.

13. a) Explain various components of GUI programming.

(OR)

b) Write a Java program to illustrate mouse events.

Question Bank

Unit-I

1. Explain various Object-Oriented programming concepts.
2. Describe various java buzz words.
3. Explain about various types if-statements with example.
4. Write about operators in java?
5. Explain about type conversion and casting.
6. Explain JVM.
7. Explain about data types in java.
8. Explain about I/O statements in Java.

Unit-II

1. Explain about overriding and overloading methods with example program.
2. Explain how to create classes, objects and methods with example program.
3. Define inheritance. Explain various types of inheritance.
4. Write about constructor with an example program.
5. Explain about polymorphism.
6. Write a java program to illustrate abstract classes and abstract methods.

Unit-III

1. Explain about exception handling mechanism.
2. What is an Interface? How to implement multiple inheritance using an interfaces?
3. Differentiate between Interfaces and Abstract classes
4. Write a Java program to illustrate packages.

Unit-IV

1. Define thread. Explain thread life cycle.
2. Write a java program to create threads.
3. Explain about byte streams.
4. Write a java program to illustrate Reading console Input and Writing Console Output

Unit-V

1. Explain various components of GUI programming.
2. Write a Java program to illustrate mouse events.
3. Explain about MVC architecture.
4. Explain delegation event model.

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-III

Course Code: 24CSCM32 Title: Data Structures using C

Hours: 3 hrs/week **Credits: 3**

Course Objectives

To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms.

Course Outcomes

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Understand various Data Structures for data storage and processing	Level-1, Level-2
CO2. Realize Linked List Data Structure for various operations	Level-1, Level-2, Level-3
CO3. Analyze step by step and develop algorithms to solve real world problems by implementing Stacks, Queues data structures.	Level-2, Level-3
CO4. Understand and implement various searching & sorting techniques	Level-3, Level-4, Level-5
CO5. Understand the Non-Linear Data Structures such as Binary Trees and Graphs	Level-3, Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	-	-	1	-	3	3	3	3
CO 2	2	-	-	-	1	-	3	3	3	2
CO 3	3	-	-	-	1	-	3	3	3	3
CO 4	3	-	-	-	1	-	3	3	3	2
CO 5	3	-	-	-	1	-	3	3	3	1

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT-I

Basic Concepts: Pointers and dynamic memory allocation, Algorithm-Definition and characteristics, Algorithm Analysis-Space Complexity, Time Complexity, Asymptotic Notation **Introduction to Data structures:** Definition**,** Types of Data structure, Abstract Data Types (ADT), **Arrays**-Concept of Arrays, Single dimensional array, Two dimensional array, Operations on arrays with Algorithms (searching, traversing, inserting, deleting)

UNIT-II

Linked List: Concept of Linked Lists, Representation of linked lists in Memory, Comparison between Linked List and Array, Types of Linked Lists - Singly Linked list, Doubly Linked list, Circularly Singly Linked list, Circularly Doubly Linked list(Basic Concepts only)

Implementation of Linked List ADT: Creating a List, Traversing a linked list, Searching linked list, Insertion and deletion into linked list (At first Node, Specified Position, Last node), Application of linked lists

UNIT-III

Stacks: Introduction to stack ADT, Representation of stacks with array and Linked List, Implementation of stacks, Application of stacks - Polish Notations - Evaluation of Post Fix Notation, Recursion: Concept and Comparison between recursion and Iteration

Queues: Introduction to Queue ADT, Representation of Queues with array and Linked List, Implementation of Queues, Application of Queues Types of Queues- Circular Queues, De-queues, Priority Queue

UNIT-IV

Searching: Linear or Sequential Search, Binary Search and Indexed Sequential Search

Sorting: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort and Merge Sort

UNIT-V

Binary Trees: Concept of Non- Linear Data Structures, Introduction Binary Trees, Types of Binary Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Applications of Binary Tree. **Graphs:** Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs (DFS, BFS), Application of Graphs.

Text Books:

1. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publications Pvt Ltd Delhi India.

2. A.K. Sharma ,Data Structure Using C, Pearson Education India.

3. “Data Structures Using C” Balagurusamy E. TMH

Reference Books

1. “Data Structures through C”, Yashavant Kanetkar, BPB Publications

2. Rajesh K. Shukla, “Data Structure Using C and C++” Wiley Dreamtech Publication.

3. Lipschutz, “Data Structures” Schaum’s Outline Series, Tata Mcgraw-hill Education (India) Pvt. Ltd .

4. Michael T. Goodrich, Roberto Tamassia, David M. Mount “Data Structures and Algorithms in C++”, Wiley India.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Algorithm analysis exercises

Evaluation Method: Programming Assignment and Correctness

Unit 2: Activity: Presentations on real-life applications of linked lists

Evaluation Method: Presentation skills or reports

Unit 3: Activity: Role-playing activities for stack operations

Evaluation Method: Problem-solving skills, communication and collaboration abilities.

Unit 4: Activity: Sorting algorithm analysis and comparison activities

Evaluation Method: Performance analysis and presentation.

Unit 5: Activity: Case Study on Applications of Graphs

Evaluation Method: Critical thinking, problem-solving, and presentation skills

III Semester
Course Code : 24CSCM32P Title : Data Structures Using C Lab
Credits -1

List of Experiments:

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array a. Add an element at the beginning of an array

    b. Insert an element at given index of array

    c. Update an element using a values and index

    d. Delete an existing element

2. Write Program to implement Single Linked List with insertion, deletion and traversal operations

3. Write Program to implement Circular doubly Linked List with insertion, deletion and traversal operations

4. Write Programs to implement the Stack operations using an array

5. Write a program using stacks to convert a given infix expression to postfix

6. Write Programs to implement the Stack operations using Liked List.

7. Write Programs to implement the Queue operations using an array.

8. Write Programs to implement the Queue operations using Liked List.

9. Write a program for Binary Search Tree Traversals

10. Write a program to search an item in a given list using the following Searching Algorithms

    a. Linear Search

    b. Binary Search.

11. Write a program for implementation of the following Sorting Algorithms

    a. Bubble Sort b. Insertion Sort

    c. Quick Sort

SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- II
Programme : B.Sc(Computer Science) – Honours
Course title: Data Structures using C
Course code_ 24CSCM32

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. Explain Big O Notation.
2. Explain Abstract data types.
3. Describe bout time and space complexities.
4. Explain linked list versus Arrays
5. Write the differences between Stack and Queue.
6. Explain Double ended Queues.
7. Explain Binary Tree Traversal.
8. Define Graph. Write Application of Graphs

PART- B

Answer **all the following** questions.
Each carries **Eight** marks 5 X 8 = 40 Marks

9. a) What is Data Structure? Describe the types of Data Structures.

or

b) Define Array. Explain various operations performed on array

10 a) Explain linear and non-linear data structures with examples.

or

b) Write about single linked list and double linked lists with example

10. a) Explain representation of Stacks through Linked Lists.

or

b)Explain circular Queues with examples.

11. a) Explain representation of Binary tree.

or

b) Write operations on a Binary Search Tree.

12. a) Explain Bubble Sort with example

or

b) Explain Linear Search with example.

Question Bank

Unit-1

1. What is Data Structure? Describe the types of Data Structures.
2. Define Array. Explain various operations performed on array.
3. Discuss about time and space complexity.
4. Explain Abstract data types.
5. Explain Big O Notation.

Unit-2

1. Describe various types of linked lists.
2. Write the differences between linked list and array.
3. What is single linked list? Write an algorithm to implement operation on single linked list.

Unit- 3

1. Implement stack operations using array.
2. Implement stack operations using linked list.
3. Write an algorithm to evaluate postfix expression.
4. Implement queue operations using array.
5. Implement queue operations using linked list.
6. Describe various types of queues.

Unit-4

1. What is searching? Explain various searching techniques.
2. Write a C program to implement Selection Sort.
3. Write an algorithm to implement Bubble Sort,
4. Explain Insertion Sort with an example.
5. Explain Quick Sort with example.

Unit-5

1. Define binary tree. Explain various binary tree traversals.
2. What is Binary Search Tree? Explain various operations on BST.
3. Define Graph. Explain various representations of graph.
4. Explain BFS algorithm with an example.
5. Explain DFS algorithm with an example.
6. Explain applications of graphs.

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-III

Course Code: 24CSCM33 Title: Computer Organization

Hours: 3 hrs/week **Credits: 3**

Course Objectives

To familiarize with organizational aspects of memory, processor and I/O.

Course Outcomes

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1 Identify different types of instructions	Level-1, Level-2
CO2. Differentiate between micro-programmed and hard-wired control units	Level-1, Level-2, Level-3
CO3. Analyse the performance of hierarchical organization of memory	Level-2, Level-3
CO4. Summarize different data transfer techniques	Level-3, Level-4, Level-5
CO5. Demonstrate arithmetic operations on fixed- and floating-point numbers and illustrate concepts of parallel processing.	Level-3, Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	-	-	1	-	3	3	3	1
CO 2	2	-	-	-	1	-	3	3	3	2
CO 3	3	-	-	-	1	-	3	3	3	2
CO 4	3	-	-	-	1	-	3	3	3	3
CO 5	3	-	-	-	1	-	3	3	3	3

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT – I

Register Transfer Language and Micro Operations: Introduction- Functional units, computer registers, register transfer language, register transfer, bus and memory transfers, arithmetic, logic and shift micro-operations, arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, instruction cycle. Register reference instructions, Memory – reference instructions, input – output and interrupt.

UNIT – II

CPU and Micro Programmed Control: Central Processing unit: Introduction, instruction formats, addressing modes. Control memory; address sequencing, design of control unit - hard wired control, micro programmed control.

UNIT – III

Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache Memory and mappings.

UNIT – IV

Input-Output Organization: Peripheral Devices, input-output interface, asynchronous data transfer, modes of transfer- programmed I/O, priority interrupt, direct memory access.

UNIT – V

Computer Arithmetic: Data representation- fixed point, floating point, addition and subtraction algorithms.

Text Books:

1. M. Moris Mano, "Computer Systems Architecture", 3rd edition, Pearson/ PHI.

Reference Books:

1. Carl Hamacher, ZvonksVranesic, SafeaZaky, "Computer Organization", 5th edition, McGraw Hill.
2. William Stallings, "Computer Organization and Architecture", 8th edition, Pearson/PHI.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Quiz competition on micro-operations.

Evaluation Method: Accuracy and speed in answering quiz questions.

Unit 2: Activity: Instruction Format Puzzle: Solving a puzzle to decode and understand instruction formats.

Evaluation Method: Accuracy and speed in completing the puzzle.

Unit 3: Activity: Memory Hierarchy Poster: Creating informative posters or infographics on memory hierarchy.

Evaluation Method: Clarity of information, presentation and creativity of visual design.

Unit 4: Activity: I/O Troubleshooting Challenge

Evaluation Method: problem identification, feasibility of proposed solutions, and clarity of explanations.

Unit 5: Activity: Case Study on Parallel processing architecture.
Evaluation Method: Understanding of parallel processing concepts and architectures

III Semester

Course Code: 24CSCM33P

Title: Computer Organization Lab

Credits -1

Lab Experiments

1. Implement a C program to convert a Hexadecimal, octal, and binary number to decimal number vice versa.
2. Implement a C program to perform Binary Addition & Subtraction.
3. Implement a C program to perform Multiplication of two binary numbers.
4. Implement arithmetic micro-operations using logic gates.
5. Implement logic and shift micro-operations using logic gates.
6. Implement a C program to perform Multiplication of two binary numbers (signed) using Booth's Algorithms.
7. Implement a C program to perform division of two binary numbers (Unsigned) using restoring division algorithm.
8. Implement a C program to perform division of two binary numbers (Unsigned) using non- restoring division algorithm.
9. Write assembly language code for A+B*(C-D) using various instruction formats in MASM or any open-source assembler.
10. Write assembly language code for A+B*C using various addressing modes in MASM or any open-source assembler.

SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- II
Programme : B.Sc(Computer Science) – Honours
Course title: Computer Organization
Course code_ 24CSCM33

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. Draw the 4-bit binary adder circuit and explain
2. Explain register reference instructions.
3. Describe various CPU organizations.
4. Explain address sequencing.
5. Explain memory hierarchy in computer system.
6. Explain various peripheral devices.
7. Explain about DMA.
8. Describe various data representations.

PART- B

Answer **all the following** questions.
Each carries **Eight** marks 5 X 8 = 40 Marks

9 (A) Draw and explain 4-bit arithmetic circuit.

(Or)

(B) Explain instruction cycle.

10. (A) Describe various addressing modes.

(Or)

(B) Explain micro programmed control.

11 (A) Explain various cache memory mappings.

(Or)

(B) Explain associative memory.

12 (A) Explain about input-output interface

(Or)

(B) Explain direct memory access.

13 (A) Explain addition algorithm.

(Or)

(B) Explain subtraction algorithm

Question Bank

Unit-I

1) Explain various functional units of computer with a neat sketch.
2) Define register. Describe different computer registers.
3) What is RTL? List out basic symbols for register transfers.
4) Describe various arithmetic micro operations.
5) Design 4-bit adder-subtractor circuit.
6) Explain 4-bit arithmetic circuit and its function table with neat sketch.
7) Explain logic micro operations.
8) Describe applications of logic micro operations.
9) Design 4-bit combinational circuit shifter with a neat sketch.
10) Explain about instruction codes.
11) Explain instruction cycle.
12) Describe memory reference instructions.
13) Explain interrupt life cycle.

Unit-II

1) Describe carious types of CPU organizations.
2) Explain various addressing modes.
3) Evaluate arithmetic expression X= (A+B) * (C+D) using Three, Two, One and Zero address instructions.
4) Explain about control memory
5) Explain about address sequencing.

Unit-III

1) Explain memory hierarchy in a computer system.
2) Describe about main memory.
3) Explain the block diagram of associative memory.
4) Explain various cache memory mapping process.

Unit-IV

1) Explain various peripheral devices.
2) Explain about input-output interface.
3) Describe about source and destination initiated strobe for data transfer.
4) Describe about source and destination initiated transfer using hand shaking.
5) Explain about Daisy-Chaining Priority interrupt with a neat sketch.
6) Explain Direct Memory Access (DMA).

Unit-V

1) Explain various representations of data.
2) Explain addition algorithm with an example.
3) Explain subtraction algorithm with an example.

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-III

Course Code: 24CSCM34 Title: Operating Systems

Hours: 3 hrs/week **Credits: 3**

Course Objectives

To gain knowledge about various functions of an operating system like memory management, process management, device management, etc.

Course Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Demonstrate knowledge and comprehension of operating system functions.	Level-1, Level-2
CO2. Analyze different process scheduling algorithms and apply them to manage processes and threads effectively	Level-1, Level-2, Level-3
CO3. Create strategies to prevent, detect, and recover from deadlocks, and design solutions for inter-process communication and synchronization problems.	Level-2, Level-3
CO4. Compare and contrast different memory allocation strategies and evaluate their effectiveness.	Level-3, Level-4, Level-5
CO5. Evaluate disk scheduling algorithms while implementing OS security measures	Level-3, Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	-	-	1	-	3	3	3	2
CO 2	2	-	-	-	1	-	3	3	3	3
CO 3	3	-	-	-	1	-	3	3	3	2
CO 4	3	-	-	-	1	-	3	3	3	1
CO 5	3	-	-	-	1	-	3	3	3	3

CO-PSO Mapping					
1-Low, 2- Moderate, 3- High, '-' No Correlation					
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT- I

What is Operating System? History and Evolution of OS, Basic OS functions, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Real time Systems, Kernel and User Modes, System Calls, Types of System calls.

UNIT- II

Process Management: Process concept, Process Scheduling, Inter Process Communication. Threads, Multi Threading Models, Thread Libraries; CPU Scheduling- Basic Concepts, Scheduling Criteria, Scheduling Algorithms-FCFS,SJF, Priority and Round Robin Algorithms.

UNIT III

Process Synchronization: Critical Section, Semaphores , Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer, Dining-Philosophers. **Deadlocks:** Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

UNIT IV

Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies–Fixed and -Variable Partitions, Paging, Segmentation.

UNIT V

File and I/O Management : Directory Structure, File Operations, File Allocation Methods, Disk Scheduling algorithms- FCFS,SSTF.

Text Books:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and Greg Gagne (7th Edition) Wiley India Edition.

Reference Books

1. Operating Systems: Internals and Design Principles by Stallings (Pearson)
2. Operating Systems by J. Archer Harris (Author), Jyoti Singh (Author) (TMH)

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Case Study on a specific Operating System: highlighting its functions and key features.

Evaluation Method: Case study presentation, depth of understanding of operating system functions, and ability to articulate key concepts.

Unit 2: Activity: Comparison Poster on Scheduling Algorithms

Evaluation Method: Assessment of posters based on content accuracy, clarity of information, visual presentation, and ability to convey key insights.

Unit 3: Activity: Assignment on Dead Lock prevention techniques

Evaluation Method: Understanding, Completion and report.

Unit 4: Activity: Debate on various Memory allocation schemes

Evaluation Method: Debate arguments, ability to counter opposing viewpoints, logical reasoning, and presentation skills.

Unit 5: Activity: Comparative study of various disk scheduling algorithms using real world datasets

Evaluation Method: Analysis methodology, accuracy of results, and presentation of findings and conclusions.

III Semester

Course Code: 24CSCM34P Title: Operating Systems Lab

Credits -1

List of Experiments:

1. Illustrate the LINUX commands a) pwd
   b) mkdir
   c) rmdir
   d) grep
   e) chmod
   f) ls
   g) rm
   h) cp

2. Write a program to calculate average waiting time and turn around time of each process using the following CPU Scheduling algorithm for the given process schedules. a) FCFS
   b) SJF
   c) Priority
   d) Round Robin

3. Simulate MVT and MFT memory management techniques
4. Write a program for Bankers Algorithm for Dead Lock Avoidance
5. Implement Bankers Algorithm Dead Lock Prevention.
6. Write a program to simulate Producer-Consumer problem.
7. Simulate all Page replacement algorithms.
   a) FIFO
   b) LRU
   c) LFU
   d) Optimal

8. Simulate Paging Techniques of memory management
9. Simulate the following disk scheduling algorithms
   a) FCFS
   b) SSTF
   c) SCAN
   d) CSCAN

SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- II
Programme : B.Sc(Computer Science) – Honours

Course title: Operating Systems Course code_ 24CSCM34

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. What is Operating System?

2.Describe real time operating systems

3.What do you mean by thread? Differentiate user level thread and kernel level thread

4What is system call? What are different types of system calls

5. What is semaphore? How mutual exclusion can be implemented using semaphore

6. Explain life cycle of the process?

7. Write about internal and external fragmentation?

8. What are various file operations

PART- B

Answer **all the following** questions.
Each carries **Eight** marks 5 X 8 = 40 Marks

9(A) Explain various types of operating systems?

(OR)

(B) Explain the role of operating system?

10 (A) Explain in detail about CPU Scheduling algorithms

(OR)

(B) What is process and explain Process control Block

11(A) Define Deadlock ? Explain Bankers Algorithm

(OR)

(B) Explain critical section problem and explain Petersons solution

12 (A) Explain in detail about Paging.

(OR)

(B) Explain various contiguous memory allocation strategies.

13 (A) Write about file allocation methods

(OR)

(B) Explain FCFS, SSTF disk scheduling Algorithms.

Operating System
Question Bank

Essay Questions

1. Explain various types of operating systems?
2. Write about History and Evolution of OS
3. Explain the role of operating system?
4. Explain in detail about CPU Scheduling algorithms
5. What is process and explain Process control Box
6. Discuss about Non-Preemptive and Preemptive Scheduling Algorithms.
7. Define Deadlock? Explain Bankers Algorithm
8. Explain critical section problem and explain Petersons solution
9. Discuss about Problems: Producer-Consumer
10. Explain in detail about Paging
11. Explain in detail about various page replacement algorithms with example
12. Write about file allocation methods
13. Write about Virtual Memory.
14. Explain the architecture of android
15. Write about security policy mechanism

Short Questions

1. What is Operating System?
2. What is Multiprogramming Systems
3. Describe real time operating systems
4. What is Threads
5. What do you mean by thread? Differentiate user level thread and kernel level thread
6. What is system call? What are different types of system calls

7. What is semaphore? How mutual exclusion can be implemented using semaphore
8. Explain life cycle of the process?
9. Write about internal and external fragmentation?
10. What are various file operations
11. What is Recovery?
12. What is Process Synchronization?
13. What is Segmentation?
14. What is Android Operating System?
15. What is Paging?

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-IV

Course Code: 24CSCM41 Title: Database Management Systems

Hours: 3 hrs/week **Credits: 3**

Learning Objectives:

To familiarize with concepts of database design

Learning Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Differentiate between database systems and file based systems.	Level-1, Level-2
CO2. Design a database using ER model	Level-1, Level-2, Level-3
CO3. Use relational model in database design	Level-2, Level-3
CO4. Use SQL commands for creating and manipulating data stored in databases.	Level-3, Level-4, Level-5
CO5. Write PL/SQL programs to work with databases	Level-3, Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	-	-	1	-	3	3	3	2
CO 2	2	-	-	-	1	-	3	3	3	1
CO 3	3	-	-	-	1	-	3	3	3	3
CO 4	3	-	-	-	1	-	3	3	3	2
CO 5	3	-	-	-	1	-	3	3	3	3

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT- I

Overview of Database Management System: Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of data base,

UNIT -II

Entity-Relationship Model: Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, **IS A** relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modeling.

UNIT - III

Relational Model: Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra Functional dependencies and normal forms upto 3rd normal form.

UNIT - IV

Structured Query Language: Introduction, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations,

UNIT - V

PL/SQL: Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.

Reference Books

1. Database Management Systems by Raghu Ramakrishnan, McGrawhill
2. Principles of Database Systems by J. D. Ullman
3. Fundamentals of Database Systems by R. Elmasri and S. Navathe
4. SQL: The Ultimate Beginners Guide by Steve Tale.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Seminar Presentation on Database Management Systems

Evaluation Method: Depth of research, clarity of explanations, ability to address questions and engage the audience.

Unit 2: Activity: Case Study on EER model

Evaluation Method: Identification of inheritance relationships, effective use of generalization and specialization, and adherence to constraints.

Unit 3: Activity: Exercise on Normalization: Assign students a set of unnormalized tables and have them normalize the tables to third normal form

Evaluation Method: Normalized table designs, identification of functional dependencies, adherence to normalization rules, and elimination of anomalies.

Unit 4: Activity: Competition on SQL Query Writing

Evaluation Method: Query correctness, efficiency, proper use of SQL commands, ability to handle complex scenarios, and creativity in query formulation.

Unit 5: Activity: Peer Review of PL/SQL code

Evaluation Method: Peer evaluation of code quality, adherence to coding standards, proper use of language elements, and logic.

IV Semester

Course 9: Database Management Systems

Credits -1

List of Experiments:

1. SQL Commands (DDL,DML)
2. SQL Functions
3. Aggregate Functions, Group by and Having clause
4. Integrity Constraints
5. PL/SQL sample programs
6. Control structures in PL/SQL
7. Loops in PL/SQL
8. Procedures, Functions in PL/SQL
9. Triggers in PL/SQL

SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- II
Programme : B.Sc(Computer Science) – Honours
Course title: Database Management Systems
Course code: 24CSCM41

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. Define DBMS and give short notes on components of DBMS
2. Write about the advantages of DBMS.
3. What is data Independence?
4. Discuss about different types of attributes in ER Model.
5. What is weak entity set and how it is represented in ER diagram
6. Write short notes on GROUP BY, ORDER BY statements in SQL.
7. Explain briefly about aggregate functions in SQL
8. What is the need for data dictionary?

PART- B

Answer **all the following** questions.
Each carries **Eight** marks 5 X 8 = 40 Marks

9 (A) Explain different data Models
(OR)
(B) Discuss in detail about three schema architecture of data base with neat diagram
10 (A) Explain ER Model in detail?.Give an example?
(OR)
(B) Explain EER model in detail
11 (A) Discuss 1NF,2NF,3NF with examples.
(OR)
(B) Explain about Relational algebra..
12 (A) Explain DDL and DML statements in SQL
(OR)
(B) Write about Data Types in SQL.
13 (A) Explain join operations in SQL.
(OR)
(B) Discuss the structure of PL/SQl program with an example.

QUESTION BANK

Essay Questions

UNIT -1

1. What is DBMS .Explain the advantages of DBMS over File systems
2. Explain Data Base Management features?
3. Explain different Data models in DBMS?
4. Explain Three schema architecture of DBMS

UNIT -2

5. Explain ER Diagrams with Example?
6. Explain ER Model with examples?
7. Explain EER Model
8. Draw the ER diagram for Library Management system and explain

UNIT -3

9. Write in detail about CODD' Rules?
10. Write in detail ,about Relational algebra?
11. What is normalization? Explain in detail about Normal forms up to 3NF?
12. Explain the following operators in relational algebra with example i)

    Selection ii) Projection iii) Rename

UNIT -4

13. Write about the data types in SQL
14. Explain DDL and DML statements in SQL
15. Explain different commands in sql with example

16. Write about Join Operations

Unit-5

17. Explain Aggregate functions in SQL

18. Explain Set Operators in Sql

19. Explain the structure of PL/ Sql Program

Short Answer Questions

1. Define DBMS and give short notes on components of DBMS
2. Write about the advantages of DBMS
3. Compare Data and Information
4. Who is DBA ? What are his responsibilities?

5. Write about attributes in ER Model
6. Discuss the concept of primary key and foreign key
7. Write Short notes on Aggregation
8. Write about weak entity and strong entity sets

9. Write about the concept of Relational Data Base
10. Write about Group by and Order By with example
11. Explain Where and Having Clause with example
12. Write about aggregate functions
13 Write Short notes on Pl/ SQL
14. Write about Set operations in SQL
15. Write about sub Query with example

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-IV

Course Code: 24CSCM42 Title: Object Oriented Software Engineering

Hours: 3 hrs/week **Credits: 3**

Course Objective:

To introduce Object-oriented software engineering (OOSE) - which is a popular technical approach to analyzing, designing an application, system, or business by applying the object- oriented paradigm and visual modeling.

Course Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Understand and apply the fundamental principles of Object-Oriented Programming (OOP) concepts and Unified Modeling Language (UML) basics, in the development of software solutions.	Level-1, Level-2
CO2. Analyze and specify software requirements, develop use cases and scenarios, apply object-oriented analysis and design (OOAD) principles	Level-1, Level-2, Level-3
CO3. Familiar with the concept of test-driven development (TDD) and its practical implementation	Level-2, Level-3
CO4. Analyze and Evaluate Software Maintenance and Evolution Strategies	Level-3, Level-4, Level-5
CO5. Apply Advanced Object-Oriented Software Engineering Concepts	Level-3, Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	-	-	1	-	3	3	3	3
CO 2	2	-	-	-	1	-	3	3	3	2
CO 3	3	-	-	-	1	-	3	3	3	3
CO 4	3	-	-	-	1	-	3	3	3	3
CO 5	3	-	-	-	1	-	3	3	3	2

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT-I

Introduction to Object-Oriented Programming: Overview of software engineering, Introduction to Object-Oriented Programming (OOP) concepts (classes, objects, inheritance, polymorphism), Unified Modeling Language (UML) basics, Introduction to software development process and software development life cycle (SDLC).

UNIT-II

Requirements Analysis and Design: Requirements analysis and specification, Use cases and scenarios, Object-oriented analysis and design (OOAD), Design patterns, UML modeling techniques (class diagrams, sequence diagrams, state machine diagrams, activity diagrams)

UNIT-III

Software Construction and Testing: Software construction basics, Object-oriented design principles, Software testing basics (unit testing, integration testing, system testing)

UNIT-IV

Software Maintenance and Evolution: Software maintenance basics, refactoring techniques Software version control, Code review and inspection, Software evolution and reengineering.

UNIT-V

Advanced Topics in Object-Oriented Software Engineering: Model-driven engineering (MDE), Aspect-oriented programming (AOP), Component-based software engineering (CBSE), Service- oriented architecture (SOA).

Text Book(s)

1. An Introduction to Object-Oriented Analysis and Design and the Unified Process, 3rd Edition, Craig Larman, Prentice-Hall.

2. Programming in Java by Sachin Malhotra, Oxford University Press

Reference Books

1. Requirements engineering: processes and techniques, G.Kotonya and, I.Sommerville, 1998, Wiley

2. Design Patterns, E.Gamma, R. Helm, R. Johnson, and J. Vlissides

3. The Unified Modeling Language Reference Manual, J. Rumbaugh, I.Jacobson and G. Booch, Addison Wesley

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Group Activity: Design and implement a small OOP project

Evaluation Method: Presentation evaluation rubric, Project evaluation based on OOP principles.

Unit 2: Activity: Use Case Scenario Presentation & Peer Activity: Review and provide feedback

on each other's use case diagrams

Evaluation Method: Presentation evaluation rubric, Peer feedback assessment.

Unit 3: Activity: Poster Presentation: Illustrate TDD principles and benefits

Evaluation Method: Poster presentation evaluation

Unit 4: Activity: Peer Activity: Analyze and discuss different maintenance strategies

Evaluation Method: Peer discussion participation evaluation

Unit 5: Activity: Seminar on Design Patterns

Evaluation Method: Depth of research, clarity of explanations, ability to address questions and engage the audience.

IV Semester
Course Code: 24CSCM42
Title: Object Oriented Software Engineering Lab
Credits -1

Suggested Software Tools:

StarUML/UMLGraph/Topcased/Umberollo/ArgoUML/ Eclipse IDE, Visual Paradigm for UML/Rational Software Architect/Any other Open Source Tool

List of Experiments:

Select domain of interest (e.g. College Management System) and identify multi-tier software application to work on (e.g. Online Fee Collection). Analyze, design and develop this application using OOSE approach:

Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).

2. Understanding of System modeling: Data model i.e. ER – Diagram and draw the ER Diagram with generalization, specialization and aggregation of specified problem statement

3. Understanding of System modeling: Functional modeling: DFD level 0 i.e. Context Diagram and draw it

4. Understanding of System modeling: Functional modeling: DFD level 1 and DFD level 2 and draw it.

5. Identify use cases and develop the use case model.

6. Identify the business activities and develop an UML Activity diagram.

7. Identity the conceptual classes and develop a domain model with UML Class diagram.

8. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.

9. Draw the state chart diagram.

10. Identify the user interface, domain objects, and technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.

11. Implement the technical services layer.

12. Implement the domain objects layer.

13. Implement the user interface layer.

14. Draw component and deployment diagrams.

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SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- II
Programme : B.Sc(Computer Science) – Honours
Course title: Object Oriented Software Engineering
Course code: 24CSCM42

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. What is software engineering?
2. Briefly describe about UML.
3. Write the differences between functional and non functional requirements.
4. Write about design patterns.
5. Discuss about software construction.
6. Explain Unit Testing.
7. Write about code reviews.
8. Describe briefly about Service- oriented architecture.

PART- B

Answer **all the following** questions.
Each carries **Eight** marks 5 X 8 = 40 Marks

9 (A) Explain various Object Oriented Programming concepts.

(Or)

(B)Explain various phases in Software Development Life Cycle with a neat diagram.

10 (A) Explain about requirements analysis.

(Or)

(B) Describe about various UML diagrams.

11 (A) Explain various object oriented design principles.

(Or)

(B) Describe about integration testing.

12 (A) Describe various refactoring techniques.

(Or)

(B) Discus about Software evolution and reengineering

13 (A) Explain Model-driven engineering (MDE)

(Or)

(B) Explain Aspect-oriented programming (AOP)

Question Bank

UNIT-I

1. Explain various Object Oriented Programming concepts.
2. Explain various phases in Software Development Life Cycle with a neat diagram.
3. Define inheritance. Explain various type of inheritance.
4. Explain about polymorphism with suitable examples.
5. Briefly describe about UML.

UNIT-II

1) Explain about requirements analysis.
2) Describe about various UML diagrams.
3) Explain about Object-oriented analysis and design (OOAD).
4) Describe various design patterns.

UNIT-III

1) Explain various object oriented design principles.
2) Describe about integration testing.
3) Explain Unit Testing.
4) Discuss about software construction.
5) Explain about system testing.

UNIT-IV

1) Describe various refactoring techniques.
2) Discus about Software evolution and reengineering.
3) Explain about Software version control.
4) Explain about Code review and inspection

UNIT-V

1) Explain about Model-driven engineering (MDE)
2) Explain Aspect-oriented programming (AOP)
3) Explain Component-based software engineering
4) Explain Service- oriented architecture (SOA).

Programme: B.Sc. Honours in Computer Science (Major) 2024-2025

SEMESTER-IV

Course Code: 24CSCM43

Title: Data Communication and Computer Networks

Hours: 3 hrs/week **Credits: 3**

Course Objectives

To provide students with a comprehensive understanding of networking principles, protocols, and technologies, enabling them to design, analyze, and evaluate efficient and reliable network solutions.

Course Outcomes

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Understand and apply network applications, hardware, software, and reference models for network communication.	Level-1, Level-2
CO2. Design and analyze data link layer protocols, multiple access protocols, and wireless LAN technologies.	Level-1, Level-2, Level-3
CO3. Design routing algorithms, congestion control algorithms, and evaluate network layer protocols for internetworking.	Level-2, Level-3
CO4. Analyze transport service, transport protocols, and evaluate UDP and TCP in the internet.	Level-3, Level-4, Level-5
CO5. Understand and evaluate application layer protocols, including DNS, email, WWW, and network management protocols.	Level-3, Level-4, Level-5

CO-PO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO 1	2	-	-	-	1	-	3	3	3	3
CO 2	2	-	-	-	1	-	3	3	3	2
CO 3	3	-	-	-	1	-	3	3	3	2
CO 4	3	-	-	-	1	-	3	3	3	3
CO 5	3	-	-	-	1	-	3	3	3	2

CO-PSO Mapping
1-Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT-I

INTRODUCTION: Network applications, network hardware, network software, reference models: OSI, TCP/IP

THE PHYSICAL LAYER: Theoretical basis for communication, guided transmission media, wireless transmission.

UNIT-II

THE DATA LINK LAYER: Design issues, error detection and correction, elementary data link protocols, sliding window protocols.

THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet, Wireless LAN, Bluetooth.

UNIT-III

THE NETWORK LAYER: Network layer design issues, routing algorithms, the network layer in the internet (IPv4 and IPv6).

UNIT-IV

THE TRANSPORT LAYER: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

UNIT-V

THE APPLICATION LAYER: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http.

APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol,

Text Book(s)

1. S. Tanenbaum (2003), Computer Networks, 4th edition, Pearson Education/ PHI, New Delhi, India

Reference Books

1. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India.
2. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Hands-on exercises to configure network applications

Evaluation Method: Practical skills in configuring network applications, hardware, and software.

Unit 2: Activity: Protocol Design and Simulation using simulation tools like NS-3 or Cisco Packet

Tracer.

Evaluation Method: Students' ability to design and simulate data link layer protocols and multiple access protocols

Unit 3: Activity: Guest Lectures and Workshops on routing algorithms, congestion control, and network layer protocols.

Evaluation Method: Students' participation and understanding demonstrated in guest lectures and workshop

Unit 4: Activity: Network Monitoring and Traffic Analysis using tools like Wireshark

Evaluation Method: Understanding of transport protocols through their analysis of network traffic and identification of UDP and TCP behavior

Unit 5: Activity: Group Projects on Network Application Development

Evaluation Method: Group Project Presentations

IV Semester

Course Code: 24CSCM43P

Title : Data Communication and Computer Networks Lab

Credits -1

List of Experiments:

1. Understanding various network tools in Windows and Linux
2. Study different types of Network devices and Cables
3. Building a Local Area Network
4. Concept of Network IP Address
5. Introduction to Network Simulator – Packet Tracer (PT)
6. Configuration of a Router using Packet Tracer
7. Implementation of a Network using Packet Tracer
8. Implementation of Static Routing using Packet Tracer
9. Implementation of RIP using Packet Tracer
10. Implementation of OSPF using Packet Tracer
11. Implement DNS using packet tracer
12. Implementation of a VLAN using Packet Tracer

SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- II
Programme : B.Sc(Computer Science) – Honours
Course title: Data Communications and Computer Networks
Course code: 24CSCM43

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. Describe applications of computer networks.
2. Explain about radio transmission.
3. Describe the services provided by data link layer to the network layer
4. Briefly explain about Bluetooth.
5. Differentiate between datagram and virtual circuit subnets
6. Describe various transport layer quality of service parameters
7. Briefly discus about e-mail.
8. Explain about FTP.

PART- B

Answer **all the following** questions.
Each carries **Eight** marks 5 X 8 = 40 Marks

9 (A) Explain OSI reference Model with neat sketch.

(Or)

(B) Explain guided transmission media.

10 (A) Explain various framing techniques in data link layer.

(Or)

(B) Explain about ALOHA.

11 (A) Explain shortest path routing.

(Or)

(B) Explain Internet Protocol (IP) header.

12 (A) Describe about TCP connection management.

(Or)

(B)Explain various transport service primitives.

13 (A) Explain about domain name system.

(Or)

(B) Describe about Simple Network Management Protocol.

Question Bank

UNIT-I

1) Explain various applications of Computer Networks.
2) Describe various types of networks.
3) Explain OSI reference model with a neat sketch,
4) Explain TCP/IP reference model with a neat sketch.
5) Explain guided transmission media.
6) Explain various wireless transmission techniques.

UNIT-II

1) Describe the services provided by data link layer to the network layer
2) Explain various framing techniques in data link layer.
3) Explain about error correcting and detecting codes.
4) Briefly describe about elementary data link protocols.
5) Briefly describe about sliding window protocols.
6) Explain about channel allocation problem.
7) Explain about ALOHA.
8) Briefly explain about Ethernet.

UNIT-III

1) Differentiate between datagram and virtual circuit subnets.
2) Explain shortest path routing.
3) Explain distance vector routing.
4) Explain Internet protocol header.
5) Write the differences between IPV4 and IPV6.

UNIT-IV

1) Describe various quality of service parameters in transport layer.
2) Explain various transport service primitives.
3) Explain the connection establishment mechanism in TCP.
4) Briefly describe about UDP.

UNIT-V

1) Explain about Domain Name System.
2) Briefly explain about E-Mail.
3) Briefly describe about World Wide Web.
4) Explain about Simple Network Management Protocol.
5) Explain about File Transfer Protocol.

Programme: B.Sc. Honoursin Computer Science (Major) 2024-2025

SEMESTER-V

Course Code: 24CSCM51 Title:Web Interface Designing Technologies

Hours: 3hrs./week **Credits: 3**

Learning Objectives:

To enable students to understand web architecture, develop aesthetic websites, create static and dynamic web pages, implement user interactivity, and gain proficiency in installing and utilizing WordPress and plugins

Learning Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Understand and appreciate the web architecture and services along with its basic building blocks	Level-1,Level-2
CO2. Gain knowledge about various components of a website related to aesthetics	Level-1,Level-2,Level-3
CO3. Demonstrate skills regarding creation of a static website and addition of dynamic behavior to a website	Level-2,Level-3
CO4. Get experience on making user-interactive web pages.	Level-3,Level-4,Level-5
CO5. Learn how to install word press and gain the knowledge of installing various plugins to use in their websites	Level-3,Level-4,Level-5

CO-POMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	-	-	-	1	-	3	3	3	2
CO2	2	-	-	-	1	-	3	3	3	3
CO3	3	-	-	-	1	-	3	3	3	3
CO4	3	-	-	-	1	-	3	3	3	2
CO5	3	-	-	-	1	-	3	3	3	3

CO-PSOMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	3
CO2	3	3	2	2	2
CO3	2	2	2	3	2
CO4	2	2	2	3	2
CO5	2	2	3	3	2

UNIT - I

HTML: Introduction to web designing, difference between web applications and desktop applications, introduction to HTML, HTML structure, elements, attributes, headings, paragraphs, images, tables, lists, blocks, symbols, embedding multi-media components in HTML, HTML forms, HTML Frames

UNIT – II

CSS: CSS home, introduction, syntax, CSS combinators, colors, background, borders, margins, padding, height/width, text, fonts, tables, lists, position, overflow, float, pseudo class, pseudo elements, opacity, tool tips, image gallery, CSS forms, CSS counters.

UNIT – III

Java Script: What is DHTML, JavaScript, basics, variables, operators, statements, string manipulations, mathematical functions, arrays, functions. objects

UNIT-IV

Client-Side Scripting: Accessing HTML form elements using Java Script object model, basic data validations, data format validations, generating responsive messages, opening windows using java script, different kinds of dialog boxes, accessing status bar using java script,

UNIT – V

Word press: Introduction to word press, features, and advantages, installing and configuring word press and understanding its admin panel (demonstration only), working with posts, managing pages, working with media - Adding, editing, deleting media elements, working with widgets, using menus, working with themes, defining users, roles and profiles, adding external links, extending word press with plug-ins.

Text Book(s)

1. Chris Bates, Web Programming Building Internet Applications, Second Edition, Wiley (2007)

2. Paul S.WangSanda S. Katila, an Introduction to Web Design plus Programming, Thomson (2007).

Reference Books

1. Head First HTML and CSS, Elisabeth Robson, Eric Freeman, O'Reilly Media Inc.

2. An Introduction to HTML and JavaScript: for Scientists and Engineers, David R. Brooks. Springer, 2007

3. Schaum's Easy Outline HTML, David Mercer, Mcgraw Hill Professional.

4. Word press for Beginners, Dr.Andy Williams.

5. Professional word press, Brad Williams, David damstra, Hanstern.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Infographic explaining the necessity to have a web site for each of the agencies such as hotels, hospitals, supermarkets, and educational institutions.

Evaluation Method: Assess the accuracy, visual design, clarity, creativity, use of visual elements, presentation of the infographic explaining the necessity of a website for different agencies.

Unit 2: Activity: Seminar though PPT on various Look and Feel components that websites related to different agencies

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids, audience engagement

Unit 3: Activity: Code snippets Challenge.

Evaluation Method: Accuracy, functionality, efficiency, code readability, and problem- solving approach of the JavaScript code snippets

Unit 4: Activity: Group discussion on different kinds of web forms that take and validate user input using java script validations

Evaluation Method: Active participation, knowledge sharing, critical thinking, and demonstration of different web forms and JavaScript validations

Unit 5: Activity: Creation of Personal website using wordpress

Evaluation Method: Design aesthetics, functionality, user interactivity, content organization, and utilization of plugins.

V Semester
Course Code: 24CSCM51P
Title: Web Interface Designing Technologies Lab
Credits -1

List of Experiments:

1. Create an HTML document with the following formatting options: (a) Bold, (b) Italics, (c) Underline, (d) Headings (Using H1 to H6 heading styles), (e) Font (Type, Size and Color), (f) Background (Colored background/Image in background), (g) Paragraph, (h) Line Break, (i) Horizontal Rule, (j) Pre tag

2. Create an HTML document which consists of: (a) Ordered List (b) Unordered List (c) Nested List (d) Image

3. Create a Table with four rows and five columns. Place an image in one column.

4. Using “table” tag, align the images as follows:

5. Create a menu form using html.

6. Style the menu buttons using CSS.

7. Create a form using HTML which has the following types of controls: (a) Text Box (b) Option/radio buttons (c) Check boxes (d) Reset and Submit buttons

8. Embed a calendar object in your web page.
9. Create a form that accepts the information from the subscriber of a mailing system.

Word press:

10. Installation and configuration of word press
11. Access admin panel and manage posts
12. Access admin panel and manage pages
13. Add widgets and menus
14. Create users and assign roles
15. Create a site and add a theme to it

SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- V
Programme :B.Sc(Computer Science) – Honours
Course title: Web Interface Designing Technologies
Course code: 24CSCM51

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. List the differences between web applications and desktop applications?
2. Explain the image tag in HTML?
3. Explain float property in CSS?
4. Explain the borders in CSS?
5. Define variable and write the naming conventions for declaring a variable?
6. Discuss about arrays in javascript?
7. What is Data Validation?
8. List the features of wordpress?

PART- B

Answer **all the following** questions.
Each carries**Eight** marks 5 X 8 = 40 Marks

9. (A) Explain structure of HTML document with an example?

(Or)

(B) Explain Lists in HTML?

10. (A) List and explain combinators in CSS?

(Or)

(B) Explain counters in CSS?

11. (A). What are the string manipulations in java script.

(Or)

(B) What are the operators available in java script?

12. (A). Explain different types of dialog boxes?

(Or)

(B) How to open a new window in JavaScript?

13. (A) Explain the roles, profiles and defining the users in WordPress?

(Or)

(B) Discuss about working with media in WordPress?

Web Interface Designing Technologies
Question Bank

Short Answer Questions:

1. List the differences between web applications and desktop applications?
2. Explain different header tags in html?
3. Explain the image tag in HTML?
4. Explain float property in CSS?
5. Explain the borders in CSS?
6. Discuss about position attribute in CSS?
7. Define variable and write the naming conventions for declaring a variable?
8. Discuss about arrays in JavaScript?
9. What is Data Validation?
10. List the features of WordPress?

Long Answer Questions:

1. Explain structure of HTML document with an example?
2. Explain Lists in HTML?
3. Explain table tag in HTML?
4. Explain different types of stylesheets in CSS?
5. List and explain combinators in CSS?
6. Explain counters in CSS?
7. What are the string manipulations in java script.
8. What are the operators available in java script?
9. Discuss about functions in JavaScript?
10. Explain different types of dialog boxes?
11. How to open a new window in JavaScript?
12. Explain the roles, profiles and defining the users in WordPress?
13. Discuss about working with media in WordPress?
14. Discuss about managing pages in WordPress?

V Semester

Course Code: 24CSCM52

Title: Web Applications Development using PHP & MYSQL

Hours: 3 hrs/week **Credits -3**

Learning Objectives:

To enable students to understand open-source tools to create dynamic web pages, implement user interactivity, and gain proficiency in developing web sites

Learning Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Write simple programs in PHP.	Level-1,Level-2
CO2. Understand how to use regular expressions, handle exceptions, and validate data using PHP.	Level-1,Level-2,Level-3
CO3. Apply In-Built functions and Create User defined functions in PHP programming.	Level-2,Level-3
CO4. Write PHP scripts to handle HTML forms.	Level-3,Level-4,Level-5
CO5. Know how to use PHP with a MySQL database and can write database driven web pages.	Level-3,Level-4,Level-5

CO-POMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	-	-	-	1	-	3	3	3	2
CO2	2	-	-	-	1	-	3	3	3	3
CO3	3	-	-	-	1	-	3	3	3	3
CO4	3	-	-	-	1	-	3	3	3	3
CO5	3	-	-	-	1	-	3	3	3	3

CO-PSOMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	3
CO2	3	3	2	2	2
CO3	2	2	2	3	2
CO4	2	2	2	3	2
CO5	2	2	3	3	2

UNIT-I

The building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants. **Flow Control Functions in PHP**: Switching Flow, Loops, Code Blocks and Browser Output. **Working with Functions:** Creating functions, Calling functions, Returning the values from User- Defined Functions, Variable Scope, Saving state between Function calls with the static statement, arguments of functions

UNIT-II

Working with Arrays: Creating Arrays, Some Array-Related Functions.

Working with Objects: Creating Objects, Accessing Object Instances, **Working with Strings**, **Dates and Time:** Formatting strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP.

UNIT-III

Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays,

Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, and **Working with File Uploads**, Managing files on server, **Exception handling.**

UNIT-IV

Working with Cookies and User Sessions: Introducing Cookies, setting a Cookie with PHP, Session Function Overview, starting a Session, working with session variables,

UNIT-V

Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, connecting to MySQL with PHP, Working with MySQL Data. Planning and Creating Database Tables, Creating Menu, Creating Record Addition Mechanism, Viewing Records, Creating the Record Deletion Mechanism.

Text Book(s)

1. Julie C. Meloni, SAMS Teach yourself PHP MySQL and Apache, Pearson Education (2007).
2. Steven Holzner , PHP: The Complete Reference, McGraw-Hill

Reference Books

1. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition O'reilly, 2014
2. Xue Bai Michael Ekedahl, The web warrior guide to Web Programming, Thomson (2006).

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Infographic explanation of client-server architecture and different server-side scripting languages.

Evaluation Method: Assess the accuracy, visual design, clarity, creativity, use of visual elements, presentation of the infographic explaining the benefits of server-side scripting languages.

Unit 2: Activity: Presentation on various open-source frameworks available in LAMP model

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual

aids, audience engagement

Unit 3: Activity: Code snippets Challenge.

Evaluation Method: Accuracy, functionality, efficiency, code readability, and problem- solving approach of the PHP code snippets

Unit 4: Activity: Group discussion on Session Management in PHP

Evaluation Method: Active participation, knowledge sharing, critical thinking, and demonstration of Session Management

Unit 5: Activity: Hands-on Lab Session on MYSQL Queries

Evaluation Method: Lab Performance and Correctness of solution Implementation

V Semester

Course Code: 24CSCM52P

Title : Web Applications Development using PHP & MYSQL Lab

Credits -1

List of Experiments:

1. Write a PHP program to Display "Hello"
2. Write a PHP Program to display the today's date.
3. Write a PHP program to display Fibonacci series.
4. Write a PHP Program to read the employee details.
5. Write a PHP program to prepare the student marks list.
6. Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
7. Create Website Registration Form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
8. Write PHP script to demonstrate passing variables with cookies.
9. Write a PHP script to connect MySQL server from your website.

10. Write a program to keep track of how many times a visitor has loaded the page.
11. Write a PHP application to perform CRUD (Create, Read, Update and Delete) operations on a database table.
12. Create a web site using any open-source framework built on PHP and MySQL – It is a team activity wherein students are divided into multiple groups and each group comes up with their own website with basic features.

SEMESTER END EXAMINATIONS MODEL PAPER

SEMESTER- V

Programme:B.Sc. (Computer Science) – Honours

Course title: Web Application Development using PHP & MYSQL

Course code: 24CSCM52

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.

Each question carries **Four** marks. 5 X 4 = 20 Marks

1. What is Variable in PHP? List the Naming convention rules for declaring a variable?
2. Discuss about functions in PHP?
3. What is an array?
4. How to create the objects in PHP?
5. Implement how many guesses made using Hidden Fields to save state in PHP?
6. Explain sending mail on form submission?
7. Write the difference between cookie and session?
8. Write the difference between MYSQL and MYSQLi?

PART- B

Answer **all the following** questions.

Each carries**Eight** marks 5 X 8 = 40 Marks

9. What is Operator and explain different operators in PHP?

OR

10. What is Loop and explain different types of loops in PHP?
11. Explain about array related functions in PHP?

OR

12. Explain about PHP Strings?

13. Discuss about Get and Post methods in PHP?

OR

14. Illustrate exception handling in PHP?

15. What is Cookie and How to create the cookie in PHP?

OR

16. Discuss about working with session variables in PHP?

17. Explain how to connect mysql with PHP.

OR

18. Explain the following: a) Creating a table b) creating a record c) Deleting a record

Web Application Development using PHP & MYSQL

Question Bank

1. Explain various data types in PHP?
2. What is Variable in PHP? List the Naming convention rules for declaring a variable?
3. Discuss about functions in PHP?
4. What is Operator and explain different operators in PHP?
5. What is Loop and explain different types of loops in PHP?
6. Discuss about various types of operators in PHP?
7. Explain about classes and objects in PHP?
8. Explain about array related functions in PHP?
9. Explain about PHP Strings?
10. Illustrate exception handling in PHP?
11. Discuss about Get and Post methods in PHP?
12. Implement how many guesses made using Hidden Fields to save state in PHP?
13. Explain sending mail on form submission?
14. Explain the mechanism to access form input with a user defined array?
15. What is Cookie and How to create the cookie in PHP?
16. Discuss about working with session variables in PHP?
17. Explain how to connect mysql with PHP.
18. Explain the following: a) Creating a table b) creating a record c) Deleting a record
19. Write the difference between cookie and session?
20. Write the difference between MYSQL and MYSQLi?

V Semester

Course Code: 24CSCM53A Title: Internet of Things

Credits -3

Learning Objectives:

To enable students to understand basic IoT constructs, create IoT solutions to real world problems using IoT

Learning Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Understand various concepts, terminologies and applications of IoT	Level-1,Level-2
CO2. Learn how to build IoT devices with development boards	Level-1,Level-2,Level-3
CO3. Understand various Wireless protocols for IoT	Level-2,Level-3
CO4 Learn how to use various sensors and actuators & develop IoT solutions using Arduino	Level-3,Level-4,Level-5
CO5. Develop and Connect IoT with Cloud Platforms	Level-3,Level-4,Level-5

CO-POMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	-	-	-	1	-	3	3	3	3
CO2	2	-	-	-	1	-	3	3	3	3
CO3	3	-	-	-	1	-	3	3	3	3
CO4	3	-	-	-	1	-	3	3	3	2
CO5	3	-	-	-	1	-	3	3	3	3

CO-PSOMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	3
CO2	3	3	2	2	2
CO3	2	2	2	3	2
CO4	2	2	2	3	2
CO5	2	2	3	3	2

UNIT - I

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

UNIT - II

Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

Unit - III

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet and Modbus.

IP Based Protocols for IoT: IPv6, 6LowPAN, LoRA, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocols.

Unit - IV

Arduino Simulation Environment: Arduino Uno Architecture, Setting up the IDE, Writing Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino, Interfacing LED, push button and buzzer with Arduino, Interfacing Arduino with LCD.

Sensor & Actuators with Arduino: Overview of Sensors working, Analog and Digital Sensors, Interfacing of Temperature, Humidity, Motion, Light and Gas Sensors with Arduino, Interfacing of Actuators with Arduino, Interfacing of Relay Switch and Servo Motor with Arduino.

Unit - V

Developing IOT's: Implementation of IoT with Arduino, Connecting and using various IoT Cloud Based Platforms such as Blynk, Thingspeak, AWS IoT, Google Cloud IoT Core etc. Cloud Computing, Fog Computing, Privacy and Security Issues in IoT.

Text Book(s)

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

2. Sudip Mishra, Anandarup Mukherjee, Arijit Roy: Introduction to IOT, Cambridge University Press.

3. Internet of Things- Dr Surya Durbha& Dr Jyoti Joglekar, Oxford University Press

Reference Books

1. Daniel Minoli, — "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications

2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Seminar on various applications of IoT through PPT

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids, audience engagement

Unit 2: Activity: Hands-on Lab activity on Arduino Development

Evaluation Method: Lab Performance and Correctness of Circuit Implementation

Unit 3: Activity: Group discussion on Future Wireless Technologies.

Evaluation Method: Active participation, knowledge sharing, critical thinking, and demonstration of different wireless technologies for IoT

Unit 4: Activity: Peer activity on different types of Sensors

Evaluation Method: Peer evaluation of working principle of Sensor, use-cases of sensors.

Unit 5: Activity: Guest Lecture or Expert talk on Cloud based IoT platforms

Evaluation Method: Active Participation, Post Talk report presentation

V Semester

Course Code 24CSCM53AP

Title: Internet of Things Lab

Credits -1

List of Experiments:

1. Understanding Arduino UNO Board and Components
2. Installing and work with Arduino IDE
3. Blinking LED sketch with Arduino
4. Simulation of 4-Way Traffic Light with Arduino
5. Using Pulse Width Modulation
6. LED Fade Sketch and Button Sketch
7. Analog Input Sketch (Bar Graph with LEDs and Potentiometre)
8. Digital Read Serial Sketch (Working with DHT/IR/Gas or Any other Sensor)
9. Working with Adafruit Libraries in Arduino
10. Spinning a DC Motor and Motor Speed Control Sketch
11. Working with Shields
12. Design APP using Blink App or Things peak API and connect it LED bulb.
13. Design APP Using Blynk App and Connect to Temperature, magnetic Sensors.

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SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- V
Programme :B.Sc(Computer Science) – Honours
Course title: Internet of Things
Course code: 24CSCM53A

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. –
2. –
3. –
4. ---
5. –
6. –
7. ---
8. –

PART- B

Answer **all the following** questions.
Each carries**Eight** marks 5 X 8 = 40 Marks

9 (A)

(Or)

(B)

10 (A)

(Or)

(B)

11 (A).

(Or)

(B)

12 (A).

(Or)

(B)

13 (A)

(Or)

(B)

V Semester

Course Code: 24CSCM53B Title: Foundations of Data Science

Hours: 3 / week **Credits -3**

Learning Objectives:

To enable students to develop IoT solutions for real-world problems

Learning Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Identify the need for data science and understand various data collection strategies	Level-1,Level-2
CO2. Understand about NoSQL and Descriptive Statistics	Level-1,Level-2,Level-3
CO3. Apply Numpy methods to process the data in an array.	Level-2,Level-3
CO4. Summarize and Compute Descriptive Statistics using Pandas	Level-3,Level-4,Level-5
CO5. Apply powerful data manipulations visualization using Pandas	Level-3,Level-4,Level-5

CO-POMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	-	-	-	1	-	3	3	3	2
CO2	2	-	-	-	1	-	3	3	3	2
CO3	3	-	-	-	1	-	3	3	3	2
CO4	3	-	-	-	1	-	3	3	3	3
CO5	3	-	-	-	1	-	3	3	3	3

CO-PSOMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	3
CO2	3	3	2	2	2
CO3	2	2	2	3	2
CO4	2	2	2	3	2
CO5	2	2	3	3	2

UNIT-I

Introduction to Data Science: Need for Data Science – What is Data Science - Evolution of Data Science, Data Science Process – Business Intelligence and Data Science – Prerequisites for a Data Scientist – Tools and Skills required. Applications of Data Science in various fields – Data Security Issues.

Data Collection Strategies, Data Pre-Processing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization,

UNIT-II

Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis; Box Plots – Pivot Table – Heat Map – Correlation Statistics –ANOVA.

No-SQL: Document Databases, Wide-column Databases and Graphical Databases.

UNIT-III

Python for Data Science –Python Libraries, Python integrated Development Environments (IDE) for Data Science, **NumPy Basics:** Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes.

Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods-Sorting- Unique and Other Set Logic.

UNIT-IV

Introduction to pandas Data Structures: Series, Data Frame and Essential Functionality: Dropping Entries- Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking.

Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.

UNIT-V

Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers-

Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

Text Book(s)

1. Y. Daniel Liang, "Introduction to Programming using Python", Pearson, 2012.

2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy,andIPython", O'Reilly, 2nd Edition, 2018.

Reference Books

1. Sanjeev Wagh, Manisha Bhende, Anuradha Thakare, 'Fundamentals of Data Science, CRC Press, 1st Edition, 2022

2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Seminar on Role of Data Science in Politics

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids, audience engagement

Unit 2: Activity: Exercises on Descriptive Statistics

Evaluation Method: Problem Solving, Accuracy

Unit 3: Activity: Hands-on Lab using Numpy

Evaluation Method: Lab Performance and Correctness of solution Implementation

Unit 4: Activity: Hands-on Lab Activity on Pandas

Evaluation Method: Lab Performance and Correctness of solution Implementation.

Unit 5: Activity: Group Activity to visualize college performance records using various plots

Evaluation Method: Active Participation, Post Talk report presentation.

V Semester
Course Code: 24CSCM53B
Title: Foundations of Data Science Lab
Credits -1

List of Experiments:

1. Study on various python IDEs for Data Science

2. Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.

3. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.

4. Computation on NumPy arrays using Universal Functions and Mathematical methods.

5. Create Pandas Series and Data Frame from various inputs.

6. Import any CSV file to Pandas Data Frame and perform the following: a. Visualize the first and last 10 records

b. Get the shape, index and column details

c. Select/Delete the records (rows)/columns based on conditions.

d. Perform ranking and sorting operations.

e. Do required statistical operations on the given column

7. Import any CSV file to Pandas Data Frame and perform the following:

a. Handle missing data by detecting and dropping/ filling missing values.

b. Transform data using apply () and map() method.

c. Detect and filter outliers.

d. Perform Vectorized String operations on Pandas Series.

e. Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.

SEMESTER END EXAMINATIONS MODEL PAPER

SEMESTER- V

Programme :B.Sc(Computer Science) – Honours

Course title: Foundations of Data Science

Course code: 24CSCM53B

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.

Each question carries **Four** marks. 5 X 4 = 20 Marks

1.What is the need of Data science?

2.What is Data Science?

3. Define mean and standard deviation?

4. Discuss about document databases?

5. Explain the slicing in Numpy?

6. Define sorting and ranking?

7. Discuss about handling missing data?

8. Discuss about detecting and filtering outliers?

PART- B

Answer **all the following** questions.

Each carries**Eight** marks 5 X 8 = 40 Marks

9. (A) Write the applications of data science in various fields?

(Or)

(B) Explain the data collection strategies?

10. (A) Discuss about wide column databases?

(Or)

(B) How to Test Variables Correlation in Data Science?

11. (A). Explain the arithmetic operations with numpy arrays?

(Or)

(B) Explain the various mathematical and statistical methods in Numpy?

12. (A). Explain the computing descriptive statistics ?

(Or)

(B) Explain reading and writing data in text format using pandas?

13. (A) What is data transformation? Explain removing and duplication ?

(Or)

(B) Write about line plots and bar plots ?

Course title: Foundations of Data Science
Question Bank

1. What is the need of Data science?
2. What is Data Science?
3. Define mean and standard deviation?
4. Discuss about document databases?
5. Explain the slicing in Numpy?
6. Write a short note on transposing arrays.
7. Define sorting and ranking?
8. What is a data frame?
9. Discuss about handling missing data?
10. Discuss about detecting and filtering outliers?
11. Write the applications of data science in various fields?
12. How to Test Variables Correlation in Data Science?
13. Explain the data collection strategies?
14. Discuss about wide column databases?
15. Explain the arithmetic operations with numpy arrays?
16. Explain the various mathematical and statistical methods in Numpy?
17. Explain the computing descriptive statistics?
18. Explain reading and writing data in text format using pandas?
19. What is data transformation? Explain removing and duplication?
20. Write about line plots and bar plots?
21. Discuss about Histograms and density plots?

V Semester
Course Code: 24CSCM54A
Title: IoT Applications Development and Programming
Theory 03 hours /Week Credits -3

Learning Objectives:

To enable students to develop IoT solutions for real-world problems

Learning Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Understand the Basic Concepts of Internet of Things	Level-1,Level-2
CO2. . Learn various Sensors and their associative protocols	Level-1,Level-2,Level-3
CO3. Learn the Single Board Computers for development of IoT	Level-2,Level-3
CO4. Build the IoT devices with the Node-RED without Complex coding	Level-3,Level-4,Level-5
CO5. Develop various IoT real-time applications	Level-3,Level-4,Level-5

CO-POMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	-	-	-	1	-	3	3	3	2
CO2	2	-	-	-	1	-	3	3	3	2
CO3	3	-	-	-	1	-	3	3	3	3
CO4	3	-	-	-	1	-	3	3	3	2
CO5	3	-	-	-	1	-	3	3	3	1

CO-PSOMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	3
CO2	3	3	2	2	2
CO3	2	2	2	3	2
CO4	2	2	2	3	2
CO5	2	2	3	3	2

UNIT-I

Overview of the Internet of Things (IoT) and Sensors: Sensors - Energy-based, Signal Output, Mode of Operation, Electronic Sensors. Connectivity - Bluetooth, Zigbee, Wi-Fi, LoRa, Wired Communication. Machine Intelligence, Active Management, Sensor Fusion, Smart Devices- Human-Computer Interaction, Context Awareness, Actuators, IoT and Smart City Applications- Automobile Sensors, Smart Home Sensors, Smart Transportation Sensors.

UNIT-II

IoT Sensors and Their Interfacing Protocols: Vision and Imaging Sensors- Line Scan Cameras, 3D Depth Cameras, **Sensors That Measure Temperature**-Thermocouples, Resistance Temperature Detector (RTD), Temperature Thermistor Sensors, Semiconductor Temperature Sensors, Radiation Sensors; Proximity Sensors, Pressure Sensors, Position Sensors, Photoelectric Sensors, Particle Sensors, Types of Particle Sensors-Metal Detectors, Level Sensors, Leak Detectors, Humidity Sensors, Gas and Chemical Sensors, Gas Detectors,Carbon Monoxide (MQ7) Detectors, Flame Detectors, **Sensor Communication Protocols**

UNIT-III

Programming Single Board Computers: Arduino Programming, Raspberry Pi-Basic functionality of Raspberry Pi B+ board, setting up the board, configuration and use, Basics of Linux and its use, Introduction to Raspberry Pi GPIO Access, Interfacing DHT, Interfacing Picam to Raspberry Pi zero w,

Pi Camera Specifications, Pi Camera Access, Interfacing PIR Sensor **Python:** File Concepts, Spreadsheet Concepts, Communication Concepts, Wired and Wireless Programming Concepts

UNIT-IV

Node-RED: Node-RED Features, Installation of Node-RED, Node-RED Architecture, Node- RED Flow Editor, Basic Function Nodes, Node-RED Library, Node-RED Applications; MQTT Protocols, Google Sheets Programming (gspread), Firebase Programming, Matplotlib- Getting Started, Bar Graphs, Scatter Plot, Spectrum Representation, Coherence of Two Signals, Cross- Correlation Graph, Autocorreleation Graph, Changing Figure Size in Different Units, Scale Pie Charts, Style Sheets- FiveThirtyEight Style Sheet, Solarized Light Style Sheet.

UNIT-V

Wireless Connectivity in IoT: Introduction, Low-Power Wide-Area Networks (LPWANs),RFID Protocol, XBEE Radios with Arduino, Bluetooth with Arduino, Arduino with a GSMModem, Arduino with Firebase Cloud Connectivity

The Internet of Things through the Raspberry Pi: Introduction, Cluster Computing with Raspberry Pi Zero W-Message Passing Interface (MPI), Networking with RP is for Simple MPI Scripts, Simple MPI Programming

Text Book(s)

1. **Internet of Things Using Single Board Computers**, *G. R. Kanagachidambaresan*, Apress, 2022.

2. **Practical Node-RED Programming**, *Taiji Hagino*, Packt Publishing, 2021

Reference Books

1. **Internet of Things Programming Projects: Build modern IoT solutions with the Raspberry Pi 3 and Python,** *Colin Dow***,** Packt Publishing, 2021

2. **Programming the Internet of Things: An Introduction to Building Integrated, Device-to-Cloud IoT Solutions,** *Andy King*, O'Reilly Media, 2021

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Case Study Presentation on Smart City IoT realization

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids, audience engagement

Unit 2: Activity: Poster Presentation for various kinds of Sensors

Evaluation Method: Creative & informative posters or infographics on Sensors

Unit 3: Activity: Hands-on Lab using RPi.

Evaluation Method: Lab Performance and Correctness of solution Implementation

Unit 4: Activity: Hands-on Lab Activity on Node-RED

Evaluation Method: Lab Performance and Correctness of solution Implementation.

Unit 5: Activity: Guest Lecture or Expert talk on Cloud based IoT platforms

Evaluation Method: Active Participation, Post Talk report presentation

V Semester

Course Code 24CSCM54AP

Tilte: IoT Applications Development and Programming Lab

Credits -1

List of Experiments:

1. Write a program to switch light on when the input is 1 and switch the light off when the input is 0 using Raspberry pi
2. Install Node-RED and Flow-based Programming Development Environment
3. Create Basic Flows with Major Nodes
4. Develop a Node-Red Flow for various Case Studies
5. Implement Node-RED in the Cloud Calling a Web API from Node-RED
6. Create a To Do Application with Node-RED Handling Sensor Data on the Raspberry Pi
7. Develop a Dashboard with various 2D Graphs with Matplotlib
8. Install MySQL database in Raspberry pi.
9. Write a program to work with basic MySQL queries by fetching data from database in Raspberry pi.
10. Arduino with Firebase Cloud Connectivity
11. Visualize Data by Creating a Server-side Application in the Firebase

SEMESTER END EXAMINATIONS MODEL PAPER

SEMESTER- V

Programme :B.Sc(Computer Science) – Honours

Course title: IoT Applications Development and Programming

Course code: 24CSCM54A

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.

Each question carries **Four** marks. 5 X 4 = 20 Marks

1. –
2. –
3. –
4. ---
5. –
6. –
7. ---
8. –

PART- B

Answer **all the following** questions.

Each carries**Eight** marks 5 X 8 = 40 Marks

9 (A)

(Or)

(B)

10 (A)

(Or)

(B)

11 (A).

(Or)

(B)

12 (A).

(Or)

(B)

13 (A)

(Or)

(B)

V Semester

Course Code: 24CSCM54B

Title : Application Development using Python

Credits -3

Learning Objectives:

To enable students to develop IoT solutions for real-world problems

Learning Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels	
CO1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.	Level-1,Level-2
CO2. Demonstrate proficiency in handling Strings and File Systems.	Level-1,Level-2,Level-3
CO3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.	Level-2,Level-3
CO4. Interpret the concepts of Web Programming and GUI in Python	Level-3,Level-4,Level-5
CO5. Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.	Level-3,Level-4,Level-5

CO-POMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	-	-	-	1	-	3	3	3	2
CO2	2	-	-	-	1	-	3	3	3	3
CO3	3	-	-	-	1	-	3	3	3	3
CO4	3	-	-	-	1	-	3	3	3	2
CO5	3	-	-	-	1	-	3	3	3	2

CO-PSOMapping
1-Low,2-Moderate, 3-High, '-'NoCorrelation

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	3
CO2	3	3	2	2	2
CO3	2	2	2	3	2
CO4	2	2	2	3	2
CO5	2	2	3	3	2

UNIT-I

Python basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Dictionaries and Set Types

Control Flow, Truthiness, Sorting, List Comprehensions, Generators and Iterators

UNIT-II

Files: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT-III

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python **Multithreaded Programming**: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT-IV

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

Web Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application, Advanced CGI, Web (HTTP) Servers

UNIT-V

Database Programming: Introduction, Python Database Application Programmer's Interface (DBAPI), Object Relational Managers (ORMs), Related Modules

Text Book(s)

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Think Python, Allen Downey, Green Tea Press.

Reference Books

1. Introduction to Python, Kenneth A. Lambert, Cengage.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
3. Learning Python, Mark Lutz, O' Really.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Hands-on Lab exercise on Python Control Statements

Evaluation Method: Lab Performance and Correctness of solution Implementation

Unit 2: Activity: Assignment of Files in Python

Evaluation Method: Problem Solving, Accuracy

Unit 3: Activity: Exercises on Regular expressions

Evaluation Method: Solutions, Accuracy of Validation

Unit 4: Activity: Poster Presentation on various GUI components in Python

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids.

Unit 5: Activity: Group Project

Evaluation Method: Project effectiveness, User interface, Solution to the Problem

V Semester
Course Code: 24CSCM54BP
Title: Application Development using Python Lab
Credits -1

List of Experiments:

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.

2. Write a python program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :

Grade A: Percentage >=80 Grade B: Percentage>=70 and 80

Grade C: Percentage>=60 and <70 Grade D: Percentage>=40 and <60 Grade E: Percentage<40

3. Demonstrate various methods of Sequence Data Types

4. Write a python program to display the first n terms of Fibonacci series.

5. Write a python program to calculate the sum and product of two compatible matrices.

6. Write a function that takes a character and returns True if it is a vowel and False otherwise.

7. Write a program to implement exception handling.

8. Write a program to implement Multithreading

9. Develop a Python GUI calculator using Tkinter

10. Write

a Python program to read last 5 lines of a file.

11. Design a simple database application that stores the records and retrieve the same

12. Design a database application to search the specified record from the database.

13. Design a database application to that allows the user to add, delete and modify the records.

SEMESTER END EXAMINATIONS MODEL PAPER

SEMESTER- V

Programme:

B.Sc. (Computer Science) – Honours

Course title: Application Development using Python

Course code: 23CSCM54B

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.

Each question carries **Four** marks. 5 X 4 = 20 Marks

1. Discuss about the built in data types in python?
2. Write a short note on set type?
3. Explain command line arguments?
4. Define module and packages?
5. List the functions of regEx?
6. List and briefly describe three other GUI frameworks for Python besides Tkinter.
7. List and briefly describe two common Python libraries used for creating web clients.
8. Identify Database Application Programmer's Interface (DBAPI) main components.

PART- B

Answer **all the following** questions.

Each carries**Eight** marks 5 X 8 = 40 Marks

9. (A) Illustrate the built in string methods in python?

(Or)

(B) Explain the various decision control statements in python?

10. (A) Discuss about the file handling methods in python?

(Or)

(B) Explain the exception handling mechanism in python?

11. (A). I**dentify** and **describe** the function of special symbols or characters used in regular expressions.

(Or)

(B) Explain the role of the Global Interpreter Lock (GIL) in Python's multithreading. Discuss how it affects thread performance in CPU-bound tasks.

12. (A). Explain various widgets in tkinter?

(Or)

(B) Compare and contrast the methods of handling HTTP requests in Python using urllib versus requests libraries. Discuss the advantages and limitations of each method.

13. (A) Explain the role of an Object Relational Manager (ORM) in Python programming.

(Or)

(B) List and briefly explain three common Python modules used for database interaction, including their primary features.

Course title: Application Development using Python

Question Bank

1. Discuss about the built in data types in python?
2. Write a short note on set type?
3. Explain command line arguments?
4. Explain namespaces?
5. Define module and packages?
6. List the functions of regEx?
7. List and briefly describe three other GUI frameworks for Python besides Tkinter.
8. List and briefly describe two common Python libraries used for creating web clients.
9. Identify Database Application Programmer's Interface (DBAPI) main components.
10. Illustrate the built in string methods in python?
11. Explain the built in methods of list?
12. Explain the various decision control statements in python?
13. Discuss about the file handling methods in python?
14. Explain the exception handling mechanism in python?
15. Identify and describe the function of special symbols or characters used in regular expressions.
16. Explain the role of the Global Interpreter Lock (GIL) in Python's multithreading. Discuss how it affects thread performance in CPU-bound tasks.
17. Explain various widgets in tkinter?
18. How to add tkinter module to an application?
19. Develop a simple Tkinter application that demonstrates the use of labels, buttons, and entry fields. Explain each part of the code and its function within the application.

20. Compare and contrast the methods of handling HTTP requests in Python using urllib versus requests libraries. Discuss the advantages and limitations of each method.
21. Explain the role of an Object Relational Manager (ORM) in Python programming.
22. List and briefly explain three common Python modules used for database interaction, including their primary features.

VII Semester

Course Code: 24CSCM71A

Title: Advanced Data Structures Credits: 3

Learning Objective:
To familiarize with the organization of data so as to optimize the searching time
Learning Outcomes: Upon completion of the course, students will be able to:
1. Apply appropriate hashing techniques for a given problem.

2. Simulate the operations of Heap trees.

3. Provide solutions using multi-way search trees.

4. Choose appropriate algorithm while establishing a network.

5. Apply the knowledge of disjoint sets for solving a given problem.

UNIT-I
Hashing – General Idea, Hash Function, Separate Chaining, Hash Tables without linked lists: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Hash Tables in the Standard Library, Universal Hashing, Extendible Hashing.

UNIT-II
Priority Queues (Heaps) – Model, Simple implementations, Binary Heap: Structure Property, Heap Order Property, Basic Heap Operations: insert, delete, Percolate down, other Heap Operations.
Binomial Queues: Binomial Queue Structure, Binomial Queue Operations, Implementation of Binomial Queue, Priority Queues in the Standard Library.
UNIT-III
Trees – **AVL**: Single Rotation, Double Rotation, B-Trees, B+ Trees
Multi-way Search Trees – 2-3 Trees: Searching for an element in a 2-3 Tree, inserting a new element in a 2-3 Tree, deleting an element from a 2-3 Tree.
Red-Black Trees – Properties of red-black trees, rotations, insertion, deletion.

UNIT-IV
Graph Algorithms – Elementary Graph Algorithms: Topological sort, Single Source Shortest Path Algorithms: Dijkstra's, Bellman-Ford, All-Pairs Shortest Paths: Floyd-Warshall's Algorithm.

UNIT-V
Disjoint Sets – Equivalence relation, Basic Data Structure, Simple Union and Find algorithms, Smart Union and Path compression algorithm.
Text Books:
1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahani and Rajasekharam, 2nd Edition, 2009, University Press Pvt. Ltd.

2. Advanced Data Structures, Reema Thareja, S. Rama Sree, Oxford University Press, 2018.

Reference Books:

1. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, 4 th Edition, 2014, Pearson.
2. Introduction to Algorithms, Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 3 rd Edition, 2009, The MIT Press.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Quiz on hashing techniques, covering concepts, algorithms, and applications.

Evaluation Method: Assess students' understanding of hashing techniques through quiz scores and performance.

Unit 2: Activity: Seminar on Heap Trees

Evaluation Method: Evaluate the clarity, depth of understanding, and presentation skills demonstrated in the seminar.

Unit 3: Activity: Group Project to design and implement a multi-way search tree data structure, along with algorithms for insertion, deletion, and searching.

Evaluation Method: Functionality, correctness, and efficiency of the multi-way search tree implementation.

Unit 4: Activity: Role Play to simulate the process of establishing a network, making algorithmic decisions along the way.

Evaluation Method: Students' understanding and application of network establishment algorithms through their decision-making process during the role play.

Unit 5: Activity: Puzzle Challenge that can be solved using disjoint sets, and encourage them to apply their knowledge to find a solution.

Evaluation Method: Assess the correctness and efficiency of students' solutions to the puzzle or problem involving disjoint sets.

VII Semester

Course Code: 24CSCM71AP

Title: Advanced Data Structures Lab Credits: 3

List of Experiments:

1. Implement Linear probing Hashing Technique.
2. Implement Quadratic probing Hashing Technique.
3. Implement Binary Heap and its operations.
4. Implement AVL Trees and its operations.
5. Implement the operations on B Trees
6. Implement 2-3 Trees and its operations.
7. Implement the operations of Red-Black trees
8. Implement Dijkstra's shortest path algorithm.
9. Implement Bellman-Ford shortest path algorithm.
10. Implement Floyd-Warshall's Algorithm.
11. Implement disjoint sets and its operations.
12. Implement Union and Find algorithms

VII Semester

Course Code: 24CSCM71B

Title: Artificial Intelligence Credits: 3

Learning Objective:

To provide students with a comprehensive understanding of artificial intelligence (AI) principles and techniques

Learning Outcomes: Students after successful completion of the course will be able to:

1. Analyze AI problems and search techniques using underlying assumptions and AI techniques.
2. Apply heuristic search techniques for problem-solving and optimization.
3. Understand knowledge representation approaches and apply predicate logic for representing facts and relationships.
4. Utilize rule-based systems for representing knowledge and apply reasoning techniques for problem-solving.
5. Implement symbolic reasoning under uncertainty and augment problem-solving strategies with non-monotonic reasoning.

UNIT- I

Problems and Search: What is Artificial Intelligence, The AI Problems, and Underlying Assumption, what is an AI Technique?

Problems, Problems Spaces, and Search: Defining the problem as a state space search,production systems, problems characteristics, issues in the design of search programs.

UNIT- II

Heuristic Search Techniques: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis

UNIT- III

Knowedge Representation Issues: Representations and Mapping, Approaches to Knowledge Representation, The frame problem. Using Predicate Logic: Representing simple facts in logic, Representing Isa relationships, predicates, Resolution.

UNIT- IV

Representing Knowledge using Rules: Procedural Vs Declarative knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge

UNIT- V

Symbolic Reasoning under Uncertainty: Introduction to Non-monotonic Reasoning, Logicsfor Non-monotonic Reasoning, Implementation issues, Augmenting a Problem solver, implementation: DFS, BFS.

Statistical Reasoning: Probability and Bayes Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-**Shafer** Theory.

Text Books:

1. Russell, S., & Norvig, P. Artificial intelligence: a Modern approach. Third Edition. Pearson new international edition. 2014.

Reference Books:

2. Artificial Intelligence, Second Edition, Elaine Rich, Kevin Knight, Tata McGraw-Hill Edition

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Group discussion on real-world AI problems and possible search techniques.

Evaluation Method: Active Participation, Presentation and analysis of group discussion outcomes.

Unit 2: Activity: Problem-solving tasks using heuristic search algorithms.

Evaluation Method: Assessment of problem-solving approach and solution quality.

Unit 3: Activity: Hands-on activity to create knowledge representations using predicate logic.

Evaluation Method: Evaluation of knowledge representation accuracy and logical reasoning.

Unit 4: Activity: Scenario-based problem-solving using rule-based systems.

Evaluation Method: Assessment of problem-solving approach and solution effectiveness.

Unit 5: Activity: Simulation activity to implement symbolic reasoning under uncertainty.

Evaluation Method: Evaluation of simulation results and reasoning accuracy.

VII Semester

Course Code: 24CSCM71BP

Title: Artificial Intelligence Lab Credits: 1

List of Experiments:

1. Write a Program to Implement Breadth First Search
2. Write a Program to Implement Depth First Search
3. Write a Program to Implement Tic-Tac-Toe game.
4. Write a Program to implement 8-Puzzle problem
5. Write a Program to Implement Water-Jug problem
6. Write a Program to Implement Travelling Salesman problem
7. Write a Program to Implement Towers of Hanoi problem
8. Write a Program to implement 8-Queens problem

VII Semester

Course Code: 24CSCM72A

Title: Computer Graphics **Credits:3**

Learning Objective:

To Develop a comprehensive understanding of computer graphics principles, techniques, and algorithms, and apply them to create visually appealing 2D and 3D graphics.

Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand computer graphics fundamentals
2. Perform 2D and 3D
3. Apply window-to-view port transformation and perform line and polygon clipping operations.
4. Determine visible surfaces and apply computer graphics algorithms for depth comparison, back-face removal, and rendering.
5. Apply animation principles, work with Flash interface, and gain an introduction to virtual reality.

UNIT-I

Introduction: Advantage of Computer Graphics and Areas of Applications, Hardware and Software for Computer Graphics- Hard Copy, Display Technologies, Random Scan Display System, Video Controller, Random Scan Display Processor, Raster Graphics, Scan Conversion Algorithms (Line, Circle, Ellipse), Area Filling (Rectangle, Ellipse), Clipping (Lines, Circle, Ellipse), Clipping Polygons

UNIT-II

Two dimensional and three-dimensional transformations: 2-Dimensional transformation, 2-D Translation, Rotation, Scaling, Homogeneous Coordinates, Reflection, Shear transform, 3-dimensional transformation, 3-D Translation, Rotation Scaling, Reflection, Shear.

UNIT-III

Clipping: Window to view port transformation, Clipping, line clipping, Cohen —Sutherland line clipping, Polygon clipping, Sutherland and Gary Hodgman polygon clipping algorithm

UNIT-IV

Visible Surface Determination and Computer Graphics algorithm: Image space and object space techniques, Hidden Surface removal—Depth comparison Z-Buffer Algorithm, Back-Face Removal, The Painter's Algorithm, Scan-Line Algorithm, Light and Color and different color models (RGB,CMY, YIQ)

UNIT-V

Animation and Virtual Reality: Basic Principles of Animation and Types of Animation, Introduction to the flash interface: Setting stage dimensions, working with panels, panel layouts, Layers & Views, Shaping Objects – Overview of shapes, Drawing & Modifying Shapes, Bitmap Images & Sounds

Animation -Principles, Frame by frame animation, tweening, masks, Introduction to virtual reality.

Text Books

1. Foley, J. D., A. V. Dam, S. K. Feiner, J. F. Hughes, Computer Graphics Principle and Practices, Addison Wesley Longman, Singapore Pvt. Ltd.,

Reference Books

1. Hearn Donald, M. P. Baker, Computer Graphics, 2E, Prentice Hall of India Private Limited, New Delhi
2. Robert R & Snow D Flash CS4 Professional Bible, Wiley Publishing

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Quiz on computer graphics concepts and terminology.

Evaluation Method: Knowledge of computer graphics principles and concepts

Unit 2: Activity: Hands-on lab sessions on 2D and 3D graphics programming.

Evaluation Method: Practical assignments evaluating the implementation of 2D and 3D graphics operations

Unit 3: Activity: Group Project on window-to-view port transformation and clipping algorithms

Evaluation Method: Project effectiveness, Functionality, Solution to the Problem

Unit 4: Activity: Seminar on visible surface determination algorithms and rendering techniques

Evaluation Method: Presentation and demonstration of projects showcasing the application of rendering algorithms and surface removal

Unit 5: Activity: Workshop on animation principles and Flash interface usage, hands-on experience with virtual reality technologies and tools

Evaluation Method: Individual projects demonstrating the application of animation principles, Flash interface usage, and virtual reality

VII Semester

Course Code: 24CSCM72AP

Title: Computer Graphics Lab Credits:1

List of Experiments:

1. Implement Brenham's line drawing algorithm for all types of slopes
2. Implement area filling algorithms
3. Create and rotate a line about a fixed point and origin.
4. Create and rotate a triangle about the origin and a fixed point.
5. Draw a color cube and spin it using OpenGL transformation matrices.
6. Clip a line using Cohen-Sutherland algorithm.
7. Implement polygon clipping algorithm
8. Implement Z-buffer algorithm
9. Implement Painter's algorithm.
10. Implement tweening

VII Semester

Course Code: 24CSCM72B

Title: Design and Analysis of Algorithms Credits: 3

Learning Objectives:

To design, develop and analyze algorithms to provide optimal solutions.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand the fundamental concepts of algorithm analysis and design techniques.
2. Apply divide and conquer design techniques for solving problems
3. Analyze the performance of given problem using greedy approach.
4. Analyze the given problem and provide the feasible solution using dynamic programming.
5. Analyze the complexity of a given problem.

UNIT-I

Introduction: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving.

Fundamentals of the Analysis of Algorithm Efficiency: Analysis framework and Asymptotic Notations and Basic Efficiency Classes, Amortized Analysis. Introduction to Brute Force Technique, Exhaustive Search.

UNIT-II

Divide and Conquer: Introduction, Merge sort, Quick sort, Binary Search, Finding Maximum and Minimum, Strassen's Matrix Multiplication

UNIT-III

The Greedy Method: Introduction, Huffman Trees and codes, Minimum Coin Change problem, Knapsack problem, Job sequencing with deadlines, Minimum Cost Spanning Trees, Single Source Shortest paths.

UNIT-IV

Dynamic Programming: Introduction, 0/1 Knapsack problem, All pairs shortest paths, Optimal Binary search trees, Travelling salesman problem.

UNIT-V

Back Tracking: Introduction, n-Queens problem, Sum of subsets, Hamiltonian cycle.

Branch and Bound: Introduction, Assignment problem, Travelling Salesman problem.

Introduction to Complexity classes: P and NP Problems, NP Complete Problems.

Text Books:

1. Fundamentals of computer algorithms, Ellis Horowitz, Sartaj Sahni, S. Rajasekharan, Second Edition, 2008, Universities Press.

Reference Books:

1. Introduction to the Design & Analysis of Algorithms, Anany Levitin, Third Edition, 2011, Pearson Education.
2. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, 2002, Pearson.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Algorithm Design Contest.

Evaluation Method: Written exam, assessing understanding and application of algorithmic concepts

Unit 2: Activity: Seminar on Divide and Conquer Problem & Solutions.

Evaluation Method: Presentation, Concept Depth, Suitable Applications in real world domain

Unit 3: Activity: Greedy Algorithm Simulation

Evaluation Method: Simulation exercise, evaluating problem analysis and greedy approach

Unit 4: Activity: Algorithm Visualization

Evaluation Method: Visual representation of algorithms, understanding, presentation and communication skills

Unit 5: Activity: Quiz on complexity analysis concepts

Evaluation Method: Understanding the Complexity classes and problem Analysis

VII Semester

Course Code: 24CSCM72BP

Title: Design and Analysis of Algorithms using Jav/Python C Lab Credits: 1

List of Experiments:

1. Write a program to implement Merge Sort and analyze its performance.
2. Write a program to implement Quick Sort and analyze its performance.
3. Write a program to find the minimum and maximum in a list of elements and analyze it's performance.
4. Write a program to implement Minimum Cost Spanning Trees and analyze its performance.
5. Write a program to implement Single source shortest path algorithm and analyze its performance.
6. Write a program to implement All pairs shortest path algorithm and analyze its performance.
7. Write a program to implement 0/1 knapscak problem and analyze its performance.
8. Write a program to implement n-Queens problem and analyze its performance.
9. Write a program to implement sum of subsets problem and analyze its performance.
10. Write a program to implement Travelling Sales man problem using Branch and Bound approach and analyze its performance.

VII Semester

Course Code: 24CSCM73A

Title: Principles of Machine Learning Credits: 3

Learning Objectives:

To design, develop and analyze algorithms to provide optimal solutions.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand the features of machine learning to apply on real world problems.
2. Characterize the machine learning algorithms as supervised learning and unsupervised learning, apply and analyze the various algorithms of supervised and unsupervised learning.
3. Analyze the concept of neural networks for learning linear and non-linear activation functions.
4. Identify an appropriate clustering technique to solve real world problems.
5. Choose a suitable machine learning model, implement and examine the performance of the chosen model for a given real world problems.

UNIT-I:

Introduction: What is Machine Learning, Examples of Various Learning Paradigms, Perspectives and Issues, Version Spaces, Finite and Infinite Hypothesis Spaces, PAC Learning

UNIT -II

Learning a Class from Examples, Linear, Non-linear, Multi-class and Multi-label classification, Generalization error bounds: VC Dimension, **Decision Trees:** ID3, Classification and Regression Trees, Regression: Linear Regression, Multiple Linear Regression, Logistic Regression.

UNIT -III

Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machines: Linear and Non-Linear, Kernel Functions, K-Nearest Neighbors.

UNIT -IV

Introduction to clustering, Hierarchical: AGNES, DIANA, Partitional: K-means clustering, K- Mode Clustering, Self-Organizing Map, Expectation Maximization, Gaussian Mixture Models, Principal components analysis (PCA).

UNIT -V

Machine Learning in Practice Design, Analysis and Evaluation of Machine Learning experiments, Feature selection Mechanisms, other issues: Imbalanced data, missing values, Outliers.

Text Books:

1. Ethem Alpaydin, Introduction to Machine Learning, MIT Press, Prentice Hall of India, Third Edition 2014

Reference Books:

1. Machine learning, Dr. S. Sridhar and M. Vijaya Lakshmi, Oxford University Press, 2021.

2. Tom Mitchell, Machine Learning, McGraw Hill, 3rd Edition,1997.

3. Sergios Theodoridis, Konstantinos Koutroumbas, Pattern Recognition, Academic Press,4th edition, 2008, ISBN:9781597492720

4. Charu C. Aggarwal, Data Classification Algorithms and Applications, CRC Press, 2014

5. Charu C. Aggarwal, DATA CLUSTERING Algorithms and Applications, CRC Press, 2014

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Case Study of real-world applications of Machine Learning

Evaluation Method: Presentation, Concept Depth, Suitable Applications in real world domain

Unit 2: Activity: Seminar on Supervised Machine Learning Algorithms

Evaluation Method: Presentation, Concept Depth, Suitable Applications in real world domain

Unit 3: Activity: Neural Network Activation Function Exploration

Evaluation Method: Hands-on activity, evaluating the understanding and analysis of linear and non-linear activation functions

Unit 4: Activity: Case Study on Clustering

Evaluation Method: Analyzing real-world clustering problems, evaluating the ability to identify and apply appropriate clustering techniques for solving real- world problems

Unit 5: Activity: Project work on Machine Learning Models

Evaluation Method: Real-world project implementation, evaluating the ability to choose and implement a suitable machine learning model for solving real- world problems.

VII Semester

Course Code: 24CSCM73AP

Title: Principles of Machine Learning Lab using Python/R Credits: 3

List of Experiments:

1. Implement Decision Tree learning.
2. Implement Logistic Regression.
3. Implement classification using Multilayer perceptron.
4. Implement classification using SVM
5. Implement K-means Clustering to Find Natural Patterns in Data.
6. Implement K-mode Clustering
7. Implement Hierarchical clustering.
8. Implement Principal Component Analysis for Dimensionality Reduction.
9. Implement Multiple Correspondence Analysis for Dimensionality Reduction.
10. Implement Gaussian Mixture Model Using the Expectation Maximization
11. Implement k-nearest neighbors' algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
12. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

VII Semester

Course Code: 24CSCM73B

Title: Software Testing **Credits: 3**

Learning Objectives:

To provide students with a comprehensive understanding of software testing principles, methodologies, and tools, enabling them to effectively design and execute various levels of testing, automate testing processes using Selenium and automation frameworks.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand software testing principles and apply effective test case design strategies.
2. Implement and execute different levels of testing
3. Utilize Selenium for automation testing, including handling web elements and utilizing advanced features.
4. Implement and leverage automation testing frameworks for efficient test automation.
5. Apply TestNG framework for advanced test execution, management, and parallel processing.

UNIT-I

Fundamentals: Software Testing Principals – Tester Role in Software Development Manual Testing and Automation Testing

Introduction to testing design strategies: Test case design strategies – Using black box approach to test case design – Random testing – Equivalence class partitioning – Boundary value analysis – Using white box approach to test design – Test adequacy criteria – Coverage and control flow graphs – Covering code logic – Paths – Their role in white box-based test design

UNIT-II

Levels of Testing: The need for levels of testing – Unit test – Unit test planning – Designing the unit tests – The class as a testable unit – The test harness – Running the unit tests and recording results – Integration tests – Designing integration tests – Integration test planning – System test – The different types – Regression testing – Alpha, beta and acceptance tests.

UNIT-III

Selenium Basics: Automation Testing, Introduction to Selenium and its Components, Selenium IDE Features, Selenium Download and Installation, Creating Scripts using Firebug and Its Installation, Locator Types

Selenium WebDriver: Selenium WebDriver Installation with Eclipse, Handling Dropdowns, Explicit and Implicit Wait, Handling Alerts/Pop-ups, Handling Web Tables, Frames, Dynamic Elements, Robot API, AutoIT

UNIT-IV Selenium Framework: Test Automation Framework: Introduction, Benefits of Automation Framework, Types of Automation framework

UNIT-V

Introduction to TestNG: TestNG Framework, TestNG installation, TestNG Annotations and Listeners, TestNG Example, TestNG Process Execution: Batch, Controlled Batch & Parallel

Text Books:

1. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003.
2. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson education, 2009.
3. Test Automation using Selenium WebDriver with Java: Step by Step Guide by Navneesh Garg
4. Absolute Beginner Java 4 Selenium Webdriver: Come Learn How to Program for Automation Testing by Rex Allen Jones II

Reference Books:

1. Elfriede Dustin, "Effective Software Testing", Pearson Education.
2. Aditya P. Mathur, "Foundations of Software Testing – Fundamental algorithms and techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education

Web Links:

https://www.softwaretestingmaterial.com/types-test-automation-frameworks/

https://www.guru99.com/introduction-to-selenium-grid.html#6

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Group discussion on software testing challenges and strategies

Evaluation Method: Assessment of participation and contribution

Unit 2: Activity: Assignment on Creation and execution of unit tests

Evaluation Method: Evaluation of accuracy and coverage of unit tests

Unit 3: Activity: Debugging and troubleshooting of test scripts

Evaluation Method: Assessment of problem-solving skills

Unit 4: Activity: Case Study on Analysis and optimization of automated test execution for efficiency

Evaluation Method: Assessment of performance improvement and resource usage

Unit 5: Activity: TestNG report generation and analysis
Evaluation Method: Assessment of report accuracy and insights

VII Semester

Course Code: 24CSCM73B

Title: Software Testing lab using Selenium **Credits: 1**

List of Experiments:

1. Study of software testing tools such as Rational Rose Test Suite, Selenium Tool

2. Installation and exploring the Selenium IDE

3. Write a script to open google.com and verify that title is Google and verify that it is redirected to google.co.in

4. Write a script to open google.co.in using chrome browser (ChromeDriver)

5. Write a script to open google.co.in using internet explorer (InternetExplorerDriver)

6. Write a script to create browser instance based on browser name

7. Write a script to search for specified option in the listbox

8. Write a script to print the content of list in sorted order.

9. Write a script to print all the options. For duplicates add entry only once. Use HashSet.

10. Write a script to close all the browsers without using quit() method.

11. Write generic method in selenium to handle all locators and return web element for any locator.

12. Write generic method in selenium to handle all locators containing dynamic wait and return web element for any locator.

VII Semester

Skill based Course

Course Code: 24CSCS71A Title: Advanced Java Programming

Credits: 3

Learning Objectives:
To provide students with a comprehensive understanding of Java Enterprise Edition (J2EE) and its associated technologies for developing robust and scalable web applications.
Learning Outcomes: Upon successful completion of the course, students will be able to:
1. Understand the multi-tier architecture of J2EE and its implementation in enterprise applications.

2. Develop web applications using Java Servlets and establish database connectivity with JDBC.

3. Create dynamic and interactive web pages using Java Server Pages (JSP) and implement JSP with beans and custom tag libraries.

4. Build enterprise applications using Enterprise Java Beans (EJB) and understand their deployment and configuration.

5. Utilize various Java technologies such as JavaMail, CORBA, and Java RMI for effective communication and distributed computing.

UNIT –I
J2EE Overview & Multi-tier Architecture: Overview of J2SE, J2EE, Advantages of Java, Birth of J2EE, Why J2EE; Distributed Systems, The Tier, J2EE Multi-tier architecture,Implementation of Client-tier, Web-tier, EJB-tier, and EIS-tier, Challenges; J2EE best practices: Enterprise Application Strategy, The Enterprise Application - Client, Session Management, Web-tier and JSPs, EJB-tier, MVC, The Myth of Using Inheritance, Maintainable Classes, Performance Enhancement, Power of Interfaces, Threads, and Notification

UNIT –II
Java Servlets & JDBC: Overview of HTML, XML, and XHTML, Java and XML, Parsing XML, Java Servlets and CGI Programming, A Simple Java Servlet, Anatomy of Servlet, Life Cycle of the Servlet, Deployment Descriptor, Reading data from client, reading HTTP requestheaders, working with cookies, Tracking sessions. Overview of JDBC, JDBC Drivers, JDBC Packages, JDBC Process, Database Connection, Statement, ResultSet, Transaction Processing, Servlet program with JDBC.

UNIT –III

Java Server Pages: Overview of JSP, JSP versus Servlet, JSP Tags: Variables and Objects, Directives, Scripting Elements, Standard Actions, Implicit Objects, Scope, Java Server Pages with Beans, Tomcat, User Sessions, Cookies, Session Objects, JSP with JDBC, Creating Custom JSP Tag Libraries.

UNIT –VI

Enterprise Java Beans: The EJB Container, EJB Classes, EJB Interfaces and Deployment Descriptions: Anatomy, Environment elements, referencing EJB, Sharing resources, Security elements, Query elements, Relationship elements, Assembly elements. Session Java Beans - stateless vs stateful, Entity Java Beans - Container-managed persistence, Bean-managed persistence. Message-driven Beans, JAR, WAR, EAR Files.

UNIT –V

JavaMail, CORBA and RMI: JavaMail API and Java Activation Framework, Protocols, Exceptions, Send Email Message, Retrieving Email Messages, Deleting Email Message. CORBA : The Concept of Object Request Brokerage, Java IDL and CORBA, The IDL Interface. Java RMI: Remote Method Invocation Concept, Server Side, and Client Side

Text Books:

1. Jim Keogh: J2EE : The Complete Reference. Mc Graw Hill

2. H. Schildt: Java 2: The Complete Reference. Mc Graw Hill

Reference Books:

1. Kogent Solutions Inc.: Java Server Programming Java EE 7 (J2EE 1.7), Black Book, Dreamtech Press

2. Subrahmanyam Allaramaju et al.: Professional JSP J2EE 1.3 Edition. Wrox Press

3. K. Qian et al.: Java Web Development Illuminated. Narosa

4. Robert W. Sebesta: Programming the World Wide Web. Pearson

VII Semester

Skill Based Course

Course Code 24CSCS71AP

Title: Advanced Java Programming Lab credits: 1

List of Experiments:

1. Study of software testing tools such as Rational Rose Test Suite, Selenium Tool
2. Write a Java program to retrieve the information from the given URL?
3. Write a java Program to create a servlet to read information from client Registration page
4. Write a java Program to create a JSP page to display a simple message along with current Date
5. Write a java Program to create a User request page in JSP
6. Write the following (JDBC) a. Connect database to Java program
   b. Program to create database table using Java
   c. Program to insert, update, delete & select records
   d. Program to delete record from database
   e. Program to execute batch of SQL statements
   f. Program to execute SQL select query

7. Write the following (EJB)
   a. Create stateless bean component
   b. Create stateless bean client
8. JavaMail Example - Send Mail in Java using SMTP
9. Java RMI - Create and execute the server application program

VII Semester

Skill based Course

Course Code: 24CSCS71B

Title: MEAN Stack Development Credits: 3

Learning Objectives:

To provide students with the knowledge and skills necessary to develop web applications using modern web development frameworks and technologies, including JavaScript, Node.js, Express, MongoDB, and AngularJS.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Gain a comprehensive understanding of web development frameworks, JavaScript fundamentals, and DOM manipulation.
2. Develop proficiency in creating Node.js applications, handling data I/O operations, and utilizing events and callbacks.
3. Build RESTful services using Node.js and Express framework, mastering HTTP handling and routing.
4. Acquire knowledge and skills in working with MongoDB, performing CRUD operations, and utilizing Mongoose for database integration.
5. Learn to build single-page applications (SPAs) using AngularJS, implementing two-way data binding and MVC architecture.

UNIT-I

Basic Web Development Framework, Node.js-to-Angular Stack Components

JavaScript Primer: Defining Variables, Understanding JavaScript Data Types, Operators, Looping, Creating Functions, Variable Scope, JavaScript Objects, Manipulating Strings, Working with Arrays, Adding Error Handling, Events and Document Object Model, HandlingJSON data, Understanding JSON Callbacks.

UNIT-II

Learning Node.js: Getting Started with Node.js, Understanding Node.js, Installing Node.js, Working with Node Packages, Concurrency and event loop fundamentals, Creating a Node.js

Application, Using Events, Listeners, Timers, and Callbacks in Nodes.js: Node.js Event Model, Adding Work to the Event Queue, Implementing Callbacks.

Handling Data I/O in Node.js: Working with JSON, Using the Buffer Module to Buffer Data, Using the Stream Module to Stream Data, Compressing and Decompressing Data with Zlib

UNIT-III

Understanding HTTP Services in Node.js: Processing URLs, Processing Query Strings and Form Parameters, Understanding Request, Response, and Server Objects. Implement HTTP Clients and Servers in Node.Js

Building REST services using Node JS REST services, Installing Express JS, Express Node project structure, Building REST services with Express framework, Routes, filters, template engines – Jade, ejs.

UNIT-IV

Understanding NoSQL and MongoDB: Why NoSQL? , Understanding MongoDB, MongoDB Data Types, MongoDB Basics and Communication with Node JS Installation, CRUD operations, Sorting, Projection, Aggregation framework, MongoDB indexes, Connecting to MongoDB with Node JS, Introduction to Mongoose, Connecting to MongoDB using mongoose, Defining mongoose schemas, CRUD operations using mongoose.

UNIT-V

Building Single Page Applications with AngularJS Single Page Application – Introduction, Two-way data binding(Dependency Injection), MVC in Angular JS, Controllers, Getting userinput, Loops, Client side routing – Accessing URL data, Various ways to provide data in Angular JS – Services and Factories, Working with filters, Directives and Cookies, The digestloop and use of $apply.

Text Books:

1. Simon Holmes , “Getting MEAN with Mongo, Express, Angular, and Node”, Second Edition, Manning Publications; 1 edition

2. Node.js, MongoDB and Angular Web Development, Brad Dayley, Brendan Dayley, Caleb Dayley, Pearson Education Inc., 2nd Edition, 2018

Reference Books:

1. Jeff Dickey, "Write Modern Web Apps with Mean Stack", Peachpit press, 2015

2. Ken Williamson, "Learning Angular JS", O'Reilly; 1 edition

3. Mithun Satheesh, "Web development with MongoDB and Node JS", Packt Publishing Limited; 2nd Revised edition.

SUGGESTED CO-CURRICULAR ACTIVITIES

1. Training of students by related industrial experts.
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Building chat application using web socket.
5. Build real time dashboard in MEAN stack using websocket
6. Develop a CURD APP for College Student Database

VII Semester

Skill based Course

Course Code: 24CSCS71BP Title: MEAN Stack Development Lab

1. Installing the Node.js and its dependencies
2. Creating a Node.js application
3. Implementing http services in Node.js
4. Implementing socket services in Node.js
5. Create registration and login forms with validations using Jscript query
6. Jscript to retrieve student information from student database using database connectivity.
7. Building MongoDB environment and managing collection
8. Manipulating MongoDB documents from Node.js
9. Develop and demonstrate Invoking data using Jscript from Mongo DB.
10. Implementing Express in Node.js
11. Implement the following in Angular JS a. Angular JS data binding.
    b. Angular JS directives and Events.
    c. Using angular JS fetching data from MySQL.
12. Understanding Angular and Creating a basic Angular application
13. Create an Online fee payment form using JScript and MongoDB.

VII Semester

Skill based Course

Course Code: 24CSCS72A Title: Mobile Application Development

Learning Objectives:

To provide students with a comprehensive understanding of mobile application development using the Android platform.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Gain a solid understanding of mobile application development principles
2. Develop proficiency in setting up the Android development environment
3. Acquire the necessary skills to handle and manage Android resources effectively
4. Develop expertise in designing user interfaces by utilizing a wide range of UI widgets
5. Learn various storage techniques in Android and Understand how to integrate web applications

UNIT-I

Mobile Application Development Introduction, advantages, difference between mobile application, Web application and Hybrid Application.

Android Operating System Introduction, Android Versions with Features, Android Architecture, OHA

UNIT-II

Android Application Development Environment: Introduction of Android Studio, Android SDK, Android Development Tools, Android Virtual Devices, Directory Structure of Android Application, Activity & Application Life Cycle, Anatomy of Android Application, Android Manifest File

UNIT-III

Android Terminologies & Resource handling Terminologies: Context, Activity, Intent, Service, Broadcast Receiver, Fragment

Resources: Working with Different Types of Resources Like String, Dimen, Integer, Drawable, Color, Style, Material Design etc.

Animation: Tween Animation and Frame by Frame Animation

UNIT-IV

UI Widgets: TextView, Button, EditText, CheckBox, RadioButton & RadioGroup, AutoCompleteTextView, Spinner, ImageView, Seekbar, ProgressBar, Dialogs

Android Layouts, Menu and Views Layouts: Linear Layout, Absolute Layout, Frame Layout, Relative Layout, Constraint Layout Creation of Layout Programmatically Menu: Option, Context

Views: Adapters, ListView, ScrollView, WebView, CardView, RecyclerView

UNIT-V

Android Storage Techniques: Shared Preferences, Files & Directories, SQLite Database Connectivity & Operations, Sharing Data Between Application Using Content Providers.

Web Application Integration Techniques and Android APIs: Introduction of JSON, JSON Parsing, Networking API, Telephony API, Web API, Building and Publishing Application to Online Application Store

Text Books:

1. Lauren Darcey and Shane Conder "Android Wireless Application Development", 2nd Edition, Pearson Education,

2. David Griffiths and Dawn Griffiths, "Head First Android Development: A Brain Friendly Guide", O`Reilly

Reference Books:

1. Mark L Murphy, "Beginning Android", Apress, 2011

2. Prasanna Kumar Dixit, "Android", Vikas Publishing House Pvt Ltd.

3. David Mark, Jack Nutting, Jeff LaMarch, "Beginning iOS 6 Development", Apress

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Mobile App Development Workshop

Evaluation Method: Students' understanding through a practical project where they develop a basic mobile application.

Unit II: Activity: Android Studio Setup and Configuration Session

Evaluation Method: Successful installation and configuration of the Android Studio development environment.

Unit III: Activity: Resource Management Challenge

Evaluation Method: Students' ability to efficiently manage and utilize different types of Android resources through a practical exercise or assignment.

Unit IV: Activity: UI Design Competition

Evaluation Method: Creativity, usability, and implementation of UI designs using various UI widgets.

Unit V: Activity: Web Integration Hackathon

Evaluation Method: Functionality, user experience, and successful data sharing between the two components during the hackathon.

VII Semester

Skill based Course

Course Code: 24CSCS72AP

Title: Mobile Application Development with Android Lab

List of Experiments:

1. Study of various IDEs for Android development
2. Setting up Android Studio in Windows
3. Develop an application that uses GUI components, Font and Colours
4. Develop an application that uses Layout Managers and event listeners.
5. Write an application that draws basic graphical primitives on the screen.
6. Develop an application that makes use of databases.
7. Develop an application that makes use of Notification Manager.
8. Implement an application that uses multi-threading.
9. Develop a native application that uses GPS location information
10. Implement an application that writes data to the SD card.
11. Implement an application that creates an alert upon receiving a message
12. Write a mobile application that makes use of RSS feed
13. Develop a mobile application to send an email.

VII Semester

Skill based Course
Course Code: 24CSCS72B Title: R Programming
Credits -3

Learning Objectives:

To equip students with the knowledge and skills to effectively use R programming language for data analysis, including data manipulation, visualization, and statistical modeling, enabling them to make data-driven decisions and insights.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Gain a solid understanding of R programming language
2. Acquire knowledge and skills in manipulating matrices, lists, and data frames, including performing operations and applying functions.
3. Develop the ability to create user-defined functions, handle variable scope, and perform exploratory data analysis, including data preprocessing and descriptive statistics.
4. Learn various data visualization techniques in R, including basic and advanced visualizations, as well as creating 3D plots.
5. Gain proficiency in inferential statistics and regression analysis using R, including simple linear regression and multiple linear regression.

UNIT-I

Introduction to R- Features of R - Environment - R Studio. Basics of R-Assignment - Modes - Operators - special numbers - Logical values - Basic Functions - R help functions - R Data Structures - Control Structures.

Vectors: Definition- Declaration - Generating - Indexing - Naming - Adding &Removing elements

- Operations on Vectors - Recycling - Special Operators - Vectorized if- then else-Vector Equality Functions for vectors - Missing values - NULL values - Filtering & Subsetting.

UNIT-II

Matrices - Creating Matrices - Adding or Removing rows/columns - Reshaping - Operations – Special functions on Matrices.

Lists - Creating List – General List Operations - Special Functions - Recursive Lists.

Data Frames -Creating Data Frames - Naming - Accessing - Adding - Removing - Applying Special functions to Data Frames - Merging Data Frames- Factors and Tables.

UNIT-III

Functions - Creating User-defined functions - Functions on Function Object - Scope of Variables - Accessing Global, Environment -Closures - Recursion.

Input / Output – Reading and Writing datasets in various formats

Exploratory Data Analysis - Data Preprocessing - Descriptive Statistics - Central Tendency - Variability - Mean - Median - Range - Variance - Summary - Handling Missing values and Outliers - Normalization

UNIT-IV

Data Visualization in R: Types of visualizations - packages for visualizations - Basic Visualizations, **Advanced Visualizations and Creating 3D plots.**

UNIT-V

Inferential Statistics with R - Types of Learning - Linear Regression- Simple Linear Regression - Implementation in R - functions on lm() - predict() - plotting and fitting regression line. **Multiple Linear Regression** - Introduction -comparison with simple linear regression - Correlation Matrix - F- Statistic - Target variables Vs Predictors - Identification of significant features - Implementation of Multiple Linear Regression in R.

Text Books:

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.

2. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc., 2012.

3. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.

Reference Books:

1. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman, “Mining of Massive Datasets”,Cambridge University Press, 2014.

2. Nathan Yau, "Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics", Wiley, 2011.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Self Learning through Online resources

Evaluation Method: Online Quiz to access understanding.

Unit II: Activity: Hands-on Lab Session through Datasets

Evaluation Method: Proficiency in manipulating the Datasets.

Unit III: Activity: Data Analysis Competition

Evaluation Method: Students' ability to preprocess data, application of Descriptive Statistics

Unit IV: Activity: Infographic Presentation on Data Visualization

Evaluation Method: Clarity, effectiveness, and aesthetics of their created visualizations.

Unit V: Activity: Project Work

Evaluation Method: Ability to apply the learnt knowledge.

VII Semester

Skill based Course

Course Code: 24CSCS72BP

Title : R Programming Lab Credits: 1

List of Experiments:

1. Installing R and R studio

2. Installing the "ggplot2", "caTools", "CART" packages and load the packages "ggplot2", "caTools".

3. Basic operations in R

4. Working with Vectors:

   a. Create a vector v1 with elements 1 to 20.

   b. Add 2 to every element of the vector v1.

   c. Divide every element in v1 by 5

   d. Create a vector v2 with elements from 21 to 30. Now add v1 to v2.

5. Getting data into R, Basic data manipulation

6. Using the data present in the table given below, create a Matrix "M" also Find the pairs of cities with shortest distance.

	C1	C2	C3	C4	C5
C1	0	12	13	8	20
C2	12	0	15	28	88
C3	13	15	0	6	9
C4	8	28	6	0	33
C5	20	88	9	33	0

7. Consider the following marks scored by the 6 students

Section	Student no	M1	M2	M3
A	1	45	54	45
A	2	34	55	55
A	3	56	66	64
B	1	43	44	45
B	2	67	76	78
B	3	76	68	37

a. Create a data structure for the above data and store in proper positions with proper names

b. Display the marks and totals for all students

c. Display the highest total marks in each section.

d. Add a new subject and fill it with marks for 2 sections.

8. Loops and functions - Find the factorial of a given number

9. Implementation of Data Frame and its corresponding operators and functions

10. Implementation of Reading data from the files and writing output back to the specified file

11. Treatment of NAs, outliers, Scaling the data, etc

12. Applying summary() to find the mean, median, standard deviation, etc

13. Implementation of Visualizations - Bar, Histogram, Box, Line, scatter plot, etc.

14. Implementation of Linear and multiple Linear Regression

15. Fitting regression line

VIII Semester

Course Code: 24CSCM81A

Title: Big Data Technologies **Credits: 3**

Learning Objectives:

To provide students with a comprehensive understanding of Big Data technologies, including Apache Hadoop, Hive, HBase, and Zookeeper, and develop practical skills in data processing, querying, and analytics for large-scale datasets.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand the importance and challenges of Big Data, including its classification and applications.
2. Familiarize with Apache Hadoop and learn data movement and MapReduce algorithms.
3. Explore Hadoop architecture, including HDFS, MapReduce tasks, and cluster setup.
4. Develop skills in Hive and HiveQL for querying and analyzing data in Hadoop.
5. Gain proficiency in HBase, including schema design, advanced indexing, and working with Zookeeper for cluster monitoring.

UNIT- I

INTRODUCTION TO BIG DATA: Introduction – Classification of digital data: Structured, Semi structured and unstructured data, Big Data and its importance, Four V's in Big data, Drivers for Big data, Challenges of Big data, Big data analytics and Big data applications.

UNIT- II

INTRODUCTION HADOOP: Big Data – Apache Hadoop & Hadoop Ecosystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce, Data Serialization.

UNIT- III

HADOOP ARCHITECTURE: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read., NameNode, Secondary NameNode, and

DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, TaskTrackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering – Monitoring & Maintenance.

UNIT-IV

HIVE AND HIVEQL: Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting and Aggregating, Map Reduce Scripts, Joins & Subqueries

UNIT-V

HBase concepts- Advanced Usage, Schema Design, Advance Indexing - Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

Text Books:

1. Big Data Black Book (Covers Hadoop 2, Map Reduce, Hive, Yarn, Pig & Data Visualization) - Dream Tech Publications
2. Big data and Analytics - Seema Acharya and Subhashini Chellappan - Wiley publications.

Reference Books:

1. “Understanding Big data”, Chris Eaton, Dirk deroos et al., McGraw Hill, 2012.
2. “Big Data Analytics”, G. Sudha Sadasivam and R. Thirumahal, Oxford University Press 2020.
3. “HADOOP: The definitive Guide” , Tom White, O Reilly 2012.
4. “Big Data Analytics with R and Haoop”, Vignesh Prajapati, Packet Publishing 2013.
5. “Oracle Big Data Handbook”, Tom Plunkett, Brian Macdonald et al, Oracle Press, 2014.

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Arrange expert lectures by IT experts working professionally in the area of Big data
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc.
4. Presentation by students on various applications of Big data.
5. Problem solving exercises.

VIII Semester

Course Code: 24CSCM81AP

Title: Big Data Technologies Lab Credits: 1

List of Experiments:

1. HDFS: Setup a hdfs in a single node to multi node cluster, perform basic file system operation on it using commands provided, monitor cluster performance

2. Write various Map Reduce programs to count the number of times a single word has occurred in a given paragraph.

3. Implement the following file management tasks in Hadoop: a. Adding files and directories, List the files and directories

   b. Retrieving files Deleting files

   c. Copying files from one folder to another in HDFS

   d. Copying files from Local File System to HDFS

4. Write a Map Reduce program to add two matrices.

5. Write a Map Reduce program to multiply a matrix with a Vector.

6. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm

7. Write a Map Reduce program that mines weather data (NCDC). Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record- oriented. (Data available at: ftp://ftp.ncdc.noaa.gov/pub/data/noaa/.)

8. Find average, max and min temperature for each year in NCDC data set

9. Stop word elimination problem:

Input: 1 A large textual file containing one sentence per line

2. A small file containing a set of stop words (One stop word per line) Output: 1. A textual file containing the same sentences of the large input file without the words appearing in the small file

10. Write a MapReduce Application to implement Combiners

11. Write a MapReduce Application to implement Reduce-side Join

VIII Semester

Course Code: 24CSCM81B

Title : Compiler Design

Learning Objectives:

To provide students with a comprehensive understanding of compiler design principles and techniques, including lexical analysis, syntax analysis, intermediate code generation, error handling, storage organization, code generation, and optimization..

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand the compiler structure and the process of lexical analysis using finite automata.
2. Acquire knowledge of syntax analysis techniques, including recursive descent parsing, predictive parsing, and LR parsing.
3. Learn about syntax-directed translation, intermediate code generation, and error detection and recovery methods in compilers.
4. Explore storage organization, dynamic storage allocation, error recovery methods, and code generation issues in compilers.
5. Develop an understanding of code optimization techniques, machine-dependent optimization, register allocation, and machine-independent optimization in compilers.

UNIT-I

Overview of the Compiler and its Structure: Language processor, Applications of language processors, Definition-Structure-Working of compiler, the science of building compilers, Difference between interpreter and compiler. Compilation of source code into target language, Types of compilers

Lexical Analysis: The Role of the Lexical Analyzer, Specification of Tokens, Recognition of Tokens, Input Buffering, elementary scanner design and its implementation (Lex), Applying concepts of Finite Automata for recognition of tokens.

UNIT-II

Syntax Analysis: Understanding Parser and CFG (Context Free Grammars), Role of Parser, Parse Tree -Elimination of Ambiguity, Left Recursion and Left Factoring of grammar

Syntax Analysis-Top Down: Top Down Parsing - Recursive Descent Parsing - Non Recursive Descent Parsing - Predictive Parsing - LL (1) Grammars.

Syntax Analysis-Bottom Up: Shift Reduce Parsers- Operator Precedence Parsing -LR Parsers, Construction of SLR Parser Tables and Parsing, CLR Parsing, LALR Parsing

UNIT-III

Syntax Directed Definition – Evaluation Order - Applications of Syntax Directed Translation- Syntax Directed Translation Schemes - Implementation of L attributed Syntax Directed Definition. **Intermediate Code Generation:** Variants of Syntax trees - Three Address Code- Types – Declarations - Procedures - Assignment Statements - Translation of Expressions - Control Flow- Back Patching- Switch Case Statements.

UNIT-IV

Error Recovery Error Detection & Recovery, Ad-Hoc and Systematic Methods Source Language Issues, Storage Organization. Stack Allocation of Space, Access to Nonlocal Data on the Stack, Parameter Passing; Symbol Tables; Language Facilities for Dynamic Storage Allocation; Dynamic Storage Allocation Techniques, Heap Management

UNIT-V

Code Generation: Issues in the Design of a Code Generator, the Target Language, Addressesin the Target Code, Basic Blocks and Flow Graphs,

Code Optimization: Optimization of Basic Blocks, A Simple Code Generator, Machine dependent optimization, Register Allocation and Assignment; The DAG Representation of Basic Blocks; Peephole Optimization; Generating Code from DAGs; Design of specifications for compilers, Machine independent optimization Error detection of recovery

Text Books:

1. A. V. Aho, Monica S. Lam, Ravi Sethi and Jeffrey D. Ullman, Compilers: Principles, techniques, &tools, Second Edition, Pearson Education, 2007.

2. K. D. Cooper and L. Torczon, Engineering a compiler, Morgan Kaufmann, 2nd edition, 2011.

3. Steven S.Muchnick, Advanced Compiler design implementation" Elsevier Science India, 2003.

4. Compiler Design by Muneeswaran, Oxford University Press

Reference Books:

1. Andrew A.Appel , Modern Compiler Implementation in Java, Cambridge University Press; 2ndedition, 2002.

2. Allen Holub, Compiler Design in C, Prentice Hall, 1990

3. TorbengidiusMogensen, Basics of Compiler Design, Springer, 2011.

4. Charles N, Ron K Cytron, Richard J LeBlanc Jr., Crafting a Complier, Pearson Education, 2010.

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Training of students by related industrial experts.

2. Assignments

3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).

4. Presentation by students on Online Compilers and its Architecture

5. Implement the back end of the compiler which takes the three-address code and produces the 8086 assembly language instructions that can be assembled and run using an 8086 assembler. The target assembly instructions can be simple move, add, sub, jump etc.

VIII Semester
Course Code: 24CSC81BP
Title: Compiler Design Lab
Credits -1

List of Experiments:

1. Implementation of a Lexical Analyzer using tools like Flex or Lex to recognize and tokenize input programs.

2. Building a Syntax Analyzer using a parser generator like Bison or YACC to verify the syntactical correctness of the input program.

3. Write a LEX program to recognize valid arithmetic expression. Identifiers in the expression could be only integers and operators could be + and *. Count the identifiers & operators present and print them separately.

4. Write a LEX program to eliminate comment lines in a C program and copy the resulting program into a separate file

5. Write YACC program to recognize all strings for which starts with ‘n’ number of ‘a’s followed by n number of ‘b’s.

6. Write YACC program to recognize valid identifier, operators and keywords in the given text (C program) file.

7. Implementation of calculator using lex and YACC.

8. Write a C Program to develop an operator precedence parser for a given language.

9. Convert the BNF rules into YACC form and write code to generate abstract syntax tree.

10. Construct a recursive descent parser for an expression.

11. Construct a Shift Reduce Parser for a given language.

12. Implement Intermediate code generation for simple expressions

VIII Semester

Course Code: 24CSCM82A

Title: Data Mining Concepts and Techniques

Learning Objectives:

To provide students with a thorough understanding of data warehousing and data mining concepts, techniques, and applications.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand data warehousing concepts, including data warehouse architecture, multidimensional data models, and OLAP operations.
2. Explore the fundamentals of data mining, including its definition, techniques, and applications in real-world scenarios.
3. Develop knowledge and skills in clustering techniques, including partitioning algorithms, hierarchical clustering, and categorical clustering.
4. Acquire proficiency in decision tree construction and the use of decision tree algorithms for data analysis and prediction.
5. Gain exposure to various advanced data mining techniques, such as neural networks, genetic algorithms, and text mining, including web mining concepts and applications.

UNIT - I

Data Warehousing: Introduction, What is Data Warehouse? Definition, Multidimensional Data Model, **OLAP** Operations, Warehouse Schema, Data Warehouse Architecture, Warehouse Server, Metadata, OLAP Engine, Data Warehouse Backend Process, Other Features

Data Pre-processing, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation

UNIT - II

Data Mining: What is Data Mining? Data Mining: Definitions, KDD vs Data Mining, DBMS vs DM, Other Related Areas, DM Techniques, Other Mining Techniques, Issues and Challenges in DM, DM Applications- Case Studies

Association Rules: What is an Association Rule? Methods to Discover Association Rules, A Priori Algorithm, Partition Algorithm, Pincer-Search Algorithm, Dynamic Itemset Counting

Algorithms, FP-Tree Growth Algorithm, Discussion on Different Algorithms, Incremental Algorithms, Border Algorithms, Generalized Association Rule, Association Rules with Item Constraints

UNIT - III

Clustering Techniques: Clustering Paradigms, Partitioning Algorithms, k-Medoid Algorithms, CLARA, CLARANS, Hierarchical Clustering, DBSCAN, BIRCH, CURE, Categorical Clustering Algorithms, STIRR, ROCK, CACTUS

UNIT – IV

Decision Trees: What is a Decision Tree? Tree Construction Principle, Best Split, Splitting Indices, Splitting Criteria, Decision Tree Construction Algorithms, CART, ID3, C4.5, Decision Tree Construction with Presorting, Rainforest, Approximate Methods, CLOUDS, BOAT, Pruning Techniques, Integration of Pruning and Construction, Ideal Algorithm.

UNIT – V

Other Techniques: What is a Neural Network? Learning in NN, Unsupervised Leaning, Data Mining Using NN: A Case Study, Genetic Algorithms, Rough Sets, Support Vector Machines

Web Mining: Web Mining, Web Content Mining, Web Structure Mining, Web Usage Mining, Text Mining, Unstructured Text, Episode Rule Discovery for Texts, Hierarchy of Categories, Text Clustering

Text Books:

1. Data Mining Techniques, Arun K Pujari, University Press
2. Data Mining: Concepts and Techniques, 3rd Edition, Jiawei Han, Micheline Kamber, Jian Pei

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Arrange expert lectures by IT experts working professionally in the area of Big data
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc.
4. Presentation by students on various applications of Data Mining.
5. Problem solving exercises.

VIII Semester

Course Code: 24CSCM82AP

Title: Data Mining Concepts and Techniques Lab

Credits:1

List of Experiments:

1. Study of various Open-Source Data Mining Tools
2. Build Data Warehouse and Explore WEKA
3. Perform data preprocessing tasks and Demonstrate
4. Perform association rule mining on data sets
5. Demonstrate performing classification on data sets
6. Demonstrate performing clustering on data sets
7. Demonstrate performing Regression on data sets
8. Credit Risk Assessment. Sample Programs using German Credit Data
9. Sample Programs using Hospital Management System

VIII Semester

Course Code: 24CSCM82B

Title: Digital Image Processing **Credits: 3**

Learning Objectives:

To provide students with a comprehensive understanding of digital image processing concepts, techniques, and applications.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand digital image processing fundamentals and applications in various domains.
2. Develop skills in spatial domain image enhancement techniques
3. Acquire proficiency in frequency domain image enhancement
4. Master in image segmentation techniques
5. Learn image compression principles.

UNIT-I

Introduction: Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Sampling and Quantization, Representing Digital Images (Data structure), Some Basic Relationships between Pixels- Neighbors and Connectivity of pixels in image, Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing.

UNIT -II

Image Enhancement in The Spatial Domain: Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

UNIT -III

Image Enhancement in Frequency Domain: Introduction, Fourier Transform, Discrete Fourier Transform (DFT), properties of DFT, Discrete Cosine Transform (DCT), Image filtering in frequency domain.

UNIT -IV

Image Segmentation: Introduction, Detection of isolated points, line detection, Edge detection, Edge linking, Region based segmentation- Region growing, split and merge technique, local processing, regional processing, Hough transform, Segmentation using Threshold.

UNIT -V

Image Compression: Introduction, coding Redundancy, Inter-pixel redundancy, image compression model, Lossy and Lossless compression, Huffman Coding, Arithmetic Coding, LZW coding, Transform Coding, Sub-image size selection, blocking, DCT implementation using FFT, Run length coding.

Text Books:

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. Jayaraman, S. Esakkirajan, and T. Veerakumar, ” Digital Image Processing”, Tata McGraw-Hill Education, 2011.

Reference Books:

1. Anil K.Jain, “Fundamentals of Digital Image Processing”, Prentice Hall of India, 9th Edition, Indian Reprint, 2002.
2. B.Chanda, D.Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2009.

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Arrange expert lectures in the area of Image Processing.
2. Assignments related to medical image processing, character recognition, signature recognition, remote sensing image processing, etc.
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Presentation by students on recent trends of Image processing.

VIII Semester

Course Code: 24CSCM82BP

Title : Digital Image Processing Lab

Credits: 1

List of Experiments:

1. Simulation and Display of an Image, Negative of an Image (Binary & Gray Scale)
2. Implementation of Relationships between Pixels.
3. Implementation of Transformations of an Image
4. Contrast stretching of a low contrast image, Histogram, and Histogram Equalization
5. Display of bit planes of an Image
6. Display of FFT(1-D & 2-D) of an image
7. Computation of Mean, Standard Deviation, Correlation coefficient of the given Image
8. Implementation of Image Smoothening Filters(Mean and Median filtering of an Image)
9. Implementation of image sharpening filters and Edge Detection using Gradient Filters
10. Image Compression by DCT,DPCM, HUFFMAN coding
11. Implementation of image restoring techniques
12. Implementation of Image Intensity slicing technique for image enhancement
13. Canny edge detection Algorithm.

VIII Semester

Course Code: 24CSCM83A

Title: Information Security and Cryptography

Credits: 3

Learning Objectives:

To provide students with a comprehensive understanding of cryptography and network security concepts and their practical applications.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Demonstrate the knowledge of cryptography, network security concepts and applications.
2. Develop security mechanisms to protect computer systems and networks.
3. Apply security principles in system design.
4. Apply methods for authentication, access control, intrusion detection and prevention.
5. Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

UNIT-I

Information Security: Introduction, History of Information security, What is Security, CIA Traid, CNSS Security Model, Components of Information System, Balancing Information Security and Access, Approaches to Information Security Implementation, The Security Systems Development Life Cycle.

Security Attacks (Interruption, Interception, Modification and Fabrication), Vulnerability, Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms.

UNIT-II

Cryptography: Concepts and Techniques, Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher, Symmetric and Asymmetric key cryptography, Steganography

Symmetric key Ciphers: DES structure, DES Analysis, Security of DES, variants of DES, Block cipher modes of operation, AES structure, Analysis of AES, Key distribution.

UNIT-III

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Analysis of RSA, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC. Digital Signatures, Authentication Protocols, Digital signature Standard.

UNIT-IV

Program Security: Secure programs, Non-malicious Program errors, Malicious codes virus, Trap doors, Salami attacks, Covert channels, Control against program.

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Email Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT-V

Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

Wireless Security, Honeypots, Traffic flow security.

Text Book(s)

1. **Principles of Information Security**: *Michael E. Whitman, Herbert J. Mattord*, CENGAGE Learning, 4th Edition.
2. **Cryptography And Network Security Principles And Practice**, Fourth or Fifth Edition, William Stallings, Pearson
3. **Security in Computing**, Fourth Edition, by *Charles P. Pfleeger*, Pearson Education

Reference Books

1. Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall.
2. Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall.
3. Principles of Information Security, Whitman, Thomson.
4. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2nd Edition

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Training of students by related industrial experts.
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Presentation by students on emerging Cyber frauds
5. Case Studies of Various Cryptographic Algorithms

VIII Semester

Course Code: 24CSCM83AP

Title: Information Security and Cryptography Lab

Credits:1

List of Experiments:

1. Write a Java Program to implement Ceaser Cipher
2. Write a Java Program to implement Playfair Cipher
3. Write a Java Program to implement Railfence Cipher
4. Write a Java Program to implement Hill Cipher with 2 x 2 Matrix
5. Write a Java Program to implement DES algorithm
6. Write a Java Program to implement RSA algorithm
7. Write a Java Program for Diffie-Hellman Key Exchange
8. Write a Java Program to Generate SHA-512 Hash of a file
9. Write a Java Program to implement Digital Signature with a File
10. Configuring S/MIME for email communication
11. Setup a honeypot and monitor the honeypot on the network
12. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG)
13. Perform wireless audit on an access point or a router and decrypt WEP and WPA (Net Stumbler)
14. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

VIII Semester

Course Code:24CSCM83B

Title: Mobile Ad hoc and Sensor Networks

Credits:3

Learning Objectives:

To provide students with a comprehensive understanding of ad hoc wireless networks, including their fundamentals, protocols, and security mechanisms.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand the concept of ad-hoc and sensor networks, their applications and typical node and network architectures.
2. Describe the MAC protocol issues of ad hoc networks.
3. Identify and describe routing protocols for ad hoc wireless networks with respect to TCP design issues.
4. Explain the concepts of network architecture and MAC layer protocol for WSN.
5. Familiar with the OS used in Wireless Sensor Networks and build basic modules

UNIT-I

Introduction to Ad Hoc Wireless Networks: Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, Radio propagation Mechanisms, Characteristics of the Wireless channel, Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet

UNIT-II

MAC Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT-III

Routing Protocols for Ad Hoc Wireless Networks: Issues in Designing a Routing Protocol, Classifications of Routing Protocols-Table driven protocols- Destination Sequenced Distance

Vector (DSDV), Wireless Routing Protocol (WRP), On-demand routing protocol-Dynamic Source Routing

(DSR), Ad Hoc On-Demand Distance Vector Routing (AODV), Hybrid routing protocols-Zone Routing Protocol (ZRP)

UNIT-IV

Transport layer and Security Protocols for Ad hoc Wireless Networks: Introduction, issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks. Classification of Transport Layer Solutions. TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

Security protocols: Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT-V

Basics of Wireless Sensors and Applications: The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Hardware-Components of Sensor Mote, Sensor Network Operating Systems–TinyOS, CONTIKIOS, Node-level Simulators – NS2 and its extension to sensor networks, COOJA, TOSSIM

Text Book(s)

1. *C. Siva Ram Murthy and B. S. Manoj*, "**Ad Hoc Wireless Networks Architectures and Protocols**", Prentice Hall, PTR, 2004.

2. *Holger Karl, Andreas willig*, *"***Protocol and Architecture for Wireless Sensor Networks***"*, John Wiley publication, Jan 2006.

Reference Books

1. *Feng Zhao, Leonidas Guibas*, **"Wireless Sensor Networks: an information processing approach"**, Elsevier publication, 2004.

2. *Charles E. Perkins*, "**Ad Hoc Networking**", Addison Wesley, 2000.

3. I.*F. Akyildiz, W. Su, Sankarasubramaniam, E. Cayirci*, **"Wireless sensor networks: a survey , computer networks"**, Elsevier, 2002, 394 - 422.

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Training of students by related industrial experts.
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Presentation by students on various Network Simulators
5. Case Studies of Various Applications of Ad hoc and Sensor Networks

VIII Semester

Course Code: 24CSCM83BP

Title: Mobile Ad hoc and Sensor Networks Lab

Credits: 1

List of Experiments:

All the experiments should be done on any Network Simulator like NS-2/NS- 2/OMNET++/OPNET etc.

1. Study various network simulators used for wireless Ad-Hoc and Sensor Networks.
2. Introduction to TCL scripting: demonstration of one small Wireless network simulation script.
3. Study various trace file formats of network simulators.
4. Implement and compare various MAC layer protocols.
5. Generate TCL script for UDP and CBR traffic in WSN nodes.
6. Generate TCL script for TCP and CBR traffic in WSN nodes.
7. Implement and compare AODV and DSR routing algorithms in MANET for various parameters.
8. Implement DSDV routing algorithms in MANET.
9. Calculate and compare average throughput for various TCP variants.
10. Implement and compare various routing protocols for wireless sensor networks.
11. Study Ethereal / Wireshark software and analyze dump files.

VIII Semester

Skill based Course

Course Code: 24CSCS81A

Title : Advanced Database Management Systems, Credits: 3

Learning Objectives:
To provide students with a Through theoretical knowledge and practical application of advanced topics in database management systems.,
Learning Outcomes: Upon successful completion of the course, students will be able to:
1. Gain understanding of relational database concepts, functional dependencies, and correctness of FDs.

2. Analyze and apply normalization techniques (3NF, BCNF, 4NF, 5NF)

3. Develop skills in processing joins, grasp materialized vs. pipelined processing

4. Learn principles of correct interleaved execution, locking mechanisms (2PL), handle deadlocks.

5. Acquire knowledge of T/O-based techniques, multi-version approaches

UNIT-I
Formal review of relational database concepts, Functional dependencies, Closure,

Correctness of FDs

UNIT-II
3NF and BCNF, 4NF and 5NF, Decomposition and synthesis approaches, Review of SQL99, Basics of query processing, external sorting, file scans

UNIT-III
Processing of joins, materialized vs. pipelined processing, query transformation rules, DB transactions, ACID properties, interleaved executions, schedules, serializability

UNIT-IV
Correctness of interleaved execution, Locking and management of locks, 2PL,

deadlocks, multiple level granularity, Concurrency Control on B+ trees, Optimistic

Concurrency Control and the concepts related to Global and Local transactions in

Distributed transactions.

UNIT-V
T/O based techniques, Multiversion approaches, Comparison of Concurrency Control methods, dynamic databases, Failure classification, recovery algorithm, XML and relational databases

Text Book(s)
1. R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw Hill, 2004

2. A. Silberschatz, H. Korth, S. Sudarshan, Database system concepts, 5/e, McGraw Hill, 2008.

Reference Books

3. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, "Database Systems: The Complete Book", Pearson, 2011.

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Performance tuning approaches by subject matter experts

2. Assignments

3. Seminars, Group discussions, Quiz, Debates etc.(on related topics).

4. Creating different kinds of indexes in Oracle and MySQL databases and compare the performance

5. Case study on the need for 2PLand transactional controls

VIII Semester

Skill based Course

Course Code 24CSCS81AP

Title: Advanced Database Management Systems Lab

Credits:1

List of Experiments:

1. Running Basic SQL commands
2. Understanding the use of Intermediate SQL
3. Running Advanced SQL related to data mining (Slicing and Dicing)
4. Creation of ER and EER diagrams for an organization
5. Database Design and Normalization for a given organization
6. Accessing Databases from Programs using JDBC
7. Analyzing query performance using explain plans
8. Creation of indexes for better query performance.
9. Running different query evaluation plans
10. Experimenting on DBMS locks and session management .

VIII Semester

Skill based Course

Course Code: 24CSCS81B Title: Cloud Computing

Credits:3

Learning Objectives:

To provide students with a comprehensive understanding of cloud computing concepts, virtualization technologies, and different service models in the context of cloud computing.

The course will explore the origins, components, and essential characteristics of cloud computing, along with the benefits and limitations associated with its adoption

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand the essential characteristics and benefits of cloud computing
2. Gain knowledge of virtualization technologies
3. Explore Microsoft implementation of virtualization and understand different cloud deployment models and their advantages.
4. Learn about Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) models,
5. Explore Software as a Service (SaaS) and its service providers.

UNIT-I

Cloud Computing Overview – Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling, Rapid elasticity, Measured service. **Cloud scenarios** – Benefits: scalability, simplicity, vendors, security. Limitations – Sensitive information - Application development – **Security concerns** - privacy concern with a third party - security level of third party - security benefits Regularity issues: Government policies.

UNIT-II

Virtualization: Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost - limitations

Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization Desktop virtualization: **Software virtualization** – Memory virtualization - Storage virtualization, **Data virtualization** – **Network virtualization**

UNIT-III

Microsoft Implementation: Microsoft Hyper V, VMware features and infrastructure – Virtual Box - Thin client

Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing

UNIT-IV

Infrastructure as a Service (IaaS): IaaS service providers – Amazon EC2, GoGrid, Rack Space, Windows Azure infrastructure services – Amazon EC service level agreement – Recent developments – Benefits

Platform as a Service (PaaS): PaaS service providers – Right Scale – Salesforce.com – Force.com – Oracle APEX cloud - Services and Benefits

UNIT-V

Software as a Service (SaaS): SaaS service providers – Google App Engine, Salesforce.com and google platform – Benefits – Operational benefits - Economic benefits – Evaluating SaaS

Text Book(s)

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christenvecctiola, S Tammaraiselvi, TMH

Reference Books

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter TATA McGraw- Hill , New Delhi - 2010

2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

3. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.

4. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madisetti, University Press

5. AWS, Azure and Saleforce web tutorials

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Training of students by Skill Development Centres
2. Hands-on Lab Sessions on Open Public Clouds
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Case Studies on operations that can be performed on IaaS, PaaS and SaaS providers

VIII Semester

Skill based Course

Course Code: 24CSCS81BP

Title: Cloud Computing Lab

Credits: 1

List of Experiments:

1. Setup virtual machines on a single computer using VMWare and VirtualBox
2. Create a network using multiple virtual machines on a single host using VMware
3. Setup a client server interaction on a single host using VMware
4. Create an AWS account and create an EC2 instance with a C compiler
5. Connect to EC2 instance and run some C programs on EC2 instance
6. Install a web server on an EC2 instance and provide access to it using Security Group rules
7. Create a virtual cloud on EC2 platform
8. Connect to Force.com and create a data entry form using Salesforce APEX
9. Create a new account on Saleforce.com and create leads, quotes and contracts
10. Analyze the services available on Oracle APEX and create sample web applications

VIII Semester

Skill based Course

Course Code: 24CSCS82A Title: Computer Vision

Credits: 3

Learning Objectives:

To equip the students with the knowledge and skills to analyze and interpret images, detect and recognize objects, estimate motion, and apply computer vision techniques in various domains such as biometrics, medical image analysis, surveillance, and augmented reality.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Understand the fundamental concepts of computer vision and its applications in various domains.
2. Apply color and geometric transforms, edge-detection techniques, filtering, and mathematical operations to analyze images.
3. Comprehend the concept of motion estimation and its applications.
4. Apply shape correspondence, shape matching, principal component analysis, and shape priors for object recognition.
5. Explore various applications of computer vision

UNIT-I

Introduction to Computer Vision: Image Processing, Computer Vision and Computer Graphics, Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia, Virtual Reality and Augmented Reality

UNIT-II

Image Representation And Analysis: Image representation, Image processing techniques like color and geometric transforms, Edge-detection Techniques, Filtering, Mathematical operations on image and its applications like convolution, filtering

UNIT-III

Motion Estimation: Introduction to motion, Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion and models

UNIT-IV

Object Recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis, Shape priors for recognition

UNIT-V

Applications: Photo album, Face detection, Face recognition, Eigen faces, Active appearance and 3D shape models of faces Application: Surveillance, foreground background separation, particle filters, Chamfer matching, tracking, and occlusion, combining views from multiple cameras, human gait analysis Application: Invehicle vision system: locating roadway, road markings, identifying road signs, locating pedestrians

Text Book(s)

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall
2. Robot Vision,by B. K. P. Horn, McGraw-Hill.
3. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012

Reference Books

1. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.
2. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs.
3. Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA). Springer, 2010
4. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
5. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Student Seminar on Applications of Computer Vision
2. Hands-on Lab Sessions on Computer Vision Techniques
3. Assignments, Seminars, Group discussions, Quiz, Debates etc.(on related topics).
4. Project Work

VIII Semester

Skill based Course

Course Code: 24CSCS82AP

Title : Computer Vision with OpenCV Lab

Credits:1

List of Experiments:

1. Import libraries
2. RGB image and resizing
3. Grayscale image
4. Image denoising, Image thresholding, Image gradients
5. Edge detection fourier transform on image
6. Line transform
7. Corner detection
8. Morphological transformation of image, Geometric transformation of image
9. Contours
10. Image pyramids
11. Color space conversion and object tracking
12. Interactive foreground extraction
13. Image segmentation, Image inpainting
14. Template matching
15. Face and eye detection

VIII Semester

Skill based Course

Course Code: 24CSCS82B Title: Digital Forensics

Credits:3

Learning Objectives:

To equip students with the knowledge and skills necessary to effectively handle digital investigations, ensuring the preservation, analysis, and presentation of digital evidence in a legally sound manner.

Learning Outcomes: Upon successful completion of the course, students will be able to:

1. Gain a clear understanding of the fundamentals of digital forensics
2. Develop knowledge and skills in analyzing storage media and file systems
3. Learn about network forensics and acquire practical skills in network packet sniffing, analysis using tools like Wireshark and TCPDUMP
4. Gain expertise in logs and event analysis, data carving
5. Develop proficiency in wireless and web attacks.

UNIT-I

Introduction to Digital Forensic: Definition of Computer Forensics, Cyber Crime, Evolution of Computer Forensics, Objectives of Computer Forensics, Roles of Forensics Investigator, Forensics Readiness, Steps for Forensics

Computer Forensics Investigation Process: Digital Forensics Investigation Process-Assessment Phase, Acquire the Data, Analyze the Data, Report the Investigation

Digital Evidence and First Responder Procedure: Digital Evidence, Digital Evidence Investigation Process. First Responders Toolkit, Issues Facing Computer Forensics, Types of Investigation, Techniques in digital forensics

UNIT-II

Understanding Storage Media and File System: The Booting Process, LINUX Boot Process, Mac OS Boot Sequence, Windows 10 Booting Sequence, File System, Type of File Systems.

Windows Forensics: Introduction to Windows Forensics, Windows Forensics Volatile Information, Windows Forensics Non- Volatile Information, Recovering deleted files and partitions, Windows Forensics Summary.

Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability Assessment Tools, Encase and FTK tools: **FTK Imager:**

Digital Forensics Road map: Static Data Acquisition from windows using FTK Imager, Live Data Acquisition using FTK Imager

Installation of KALI Linux, RAM Dump Analysis using Volatility, Static Data Acquisition from Linux OS

UNIT-III

Recovering Deleted Files and Partitions: Digital Forensics Tools, Overview of EnCase Forensics, Deep Information Gathering Tool: Dmitry Page, Computer Forensics Live Practical by using Autopsy and FTK Imager

Network Forensics: Introduction to Network Forensics, Network Components and their forensic importance, OSI internet Layers and their Forensic importance, Tools Introduction Wireshark and TCPDUMP, Packet Sniffing and Analysis using Ettercap and Wireshark, Wireshark Packet Analyzer, Packet Capture using TCP DUMP

Website Penetration: WHOIS, nslookup

UNIT-IV

Logs & Event Analysis: Forensic Analysis using AUTOPSY: Linux and Windows, Forensics and Log analysis, Compare and AUDIT Evidences using Hashdeep Page

Data Carving using Bulk Extractor: Kali Linux and Windows, Recovering Evidence from Forensic Images using Foremost

Application Password Cracking: Introduction to Password Cracking, Password Cracking using John the Ripper, Password Cracking using Rainbow Tables, PDF File Analysis, Remote Imaging using E3 Digital Forensics

UNIT-V

Wireless and Web Attacks: WiFi Packet Capture and Password Cracking using Aircrack ng, Introduction to Web Attacks, Website Copier: HTTRACK, SQL Injection, Site Report Generation:

Netcraft, Vulnerability Analysis: Nikto, Wayback Machine, Image Metadata Extraction using Imago

Email Forensics Investigation: Email Forensics Investigations, **Mobile Device Forensics:** Mobile Forensics

Preparation for Digital Forensic investigation: Investigative reports, expert witness and cyber regulations, Introduction to Report Writing, Forensic Reports & Expert Witness

Text Book(s)

1. **Digital Forensics**, *Dr.Jeetendra Pande, Dr. Ajay Prasad,* Uttarakhand Open University, Haldwan 2016

2. *Nilakshi Jain, Dhananjay Kalbande*, **"Digital Forensic: The fascinating world of Digital Evidences"** Wiley India Pvt Ltd 2017.

3. *Cory Altheide, Harlan Carvey* **"Digital forensics with open source tools**" Syngress Publishing, Inc. 2011.

4. *Chris McNab*, **Network Security Assessment**, By O'Reilly.

Reference Books

1. *Jason Luttgens, Matthew Pepe, Kevin Mandia*, **"Incident Response and computer forensics",**3rd Edition Tata McGraw Hill, 2014.

2. *Clint P Garrison,* **"Digital Forensics for Network, Internet, and Cloud Computing A forensic evidence guide for moving targets and data"** , Syngress Publishing, Inc. 2010

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Training of students by related industrial experts.
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Case Studies: Vulnerability Assessment of Your College Website

VIII Semester

Skill based Course

Course Code: 24CSCS82BP Title: Digital Forensics Lab

Credits -1

List of Experiments:

1. Study of Computer Forensics and different tools used for forensic investigation

2. How to Recover Deleted Files using Forensics Tools

3. Study the steps for hiding and extract any text file behind an image file/ Audio file (Steganography)

4. How to Extract Exchangeable image file format (EXIF) Data from Image Files using Exifreader Software

5. Data Acquisition using FTK imager

6. How to make the forensic image of the hard drive using EnCase Forensics/Autopsy

7. How to Restoring the Evidence Image using EnCase Forensics/Autopsy

8. How to Collect Email Evidence in Victim PC

9. How to Extracting Browser Artifacts

10. How to View Last Activity of Your PC

11. Find Last Connected USB on your system (USB Forensics)

12. Comparison of two Files for forensics investigation by Compare IT software

13. Live Forensics Case Investigation using Autopsy

SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER- ****
Programme : B.Sc(Computer Science) – Honours

Course title: xxxxx **Course code: xxxxx**

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions.
Each question carries **Four** marks. 5 X 4 = 20 Marks

1. –
2. –
3. –
4. ---
5. –
6. –
7. ---
8. –

PART- B

Answer **all the following** questions.
Each carries **Eight** marks 5 X 8 = 40 Marks

9 (A)

(Or)

(B)

10 (A)

(Or)

(B)

11(A).

(Or)

(B)

12 (A).

(Or)

(B)

13 (A) (Or) (B)

List of Computer Science Faculty Members

S.No.	Name of the Faculty	College	Experience	Phone No.
1	Smt D. Aruna Padma	Visakha GDC (W)	18	9030615618
2	Sri M Ravi Kiran Kumar	GDC Seethampeta	7	9949976158
3	Smt I Sri Lakshmi	GDC(W)(A) , Srikakulam	7	9492543638
4	Sri B Raghu Ram	GDC(M) Srikakulam	7	8886003083
5	Smt Sri Devi	GDC(A) Tuni	3	9985135993
6	Sri Rasmi Ranjan Khansama	GDC(A) Tuni	3	6371002597
7	Smt K Leela Pavani	GDC Chintapalli	3	9948487769
8	Ms Ch Kavitha	GDC Tekkali	3	9966734743
9	Sri Bhadrachalam	GDC(A), Palakollu	3	9573523795
10	Sri M Venkateswara Rao	GDC, Nakkapalli	19	8790934202
11	Sri G Vasudeva Rao	GDC Ponduru	6	9963559593
12	Sri R V Satyanarayana	PR GDC(A) , Kakinada	6	9394052555
13	Dr N Sridhar	GDC(A) , Tuni	6	9483999000
14	Dr J Sarada Lakshmi	SRR CVR GDC(A), Vijayawada.	2	9246660822
15	K Krishna Kumar	Gayatri Vidya Parishad	16	9247169341