DEPARTMENT OF COMPUTER SCIENCE

B.Sc.-Honours
(Computer Science)

Government College (A)

Rajahmundry

Accredited with 'A+' grade by NAAC

2023-24

Proceedings of the Principal, Government College (Autonomous), Rajahmundry
Present: Dr. C. Krishna, M.Sc.Tech, NET., Ph.D.

Rc. No: Spl./Acad.Cell-GCRJY/BOS/2023-24, Dated: 28 June 2023

Sub:- Government College (Autonomous), Rajahmundry– **Boards of Studies** (BoS) –2023-24 Nomination of Members - Orders Issued.

Ref:- 1. UGC Guidelines for Autonomous Colleges - 2018.
2. Proceedings of the Vice-Chancellor, ANUR No. ANUR Government College (A) Rajahmundry, dated 01-06-2023.
3. UGC, Curriculum and Credit Framework for undergraduate programs dated 7 December 2022.

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ORDER:

The Principal, Government College (Autonomous), Rajahmundry is pleased to constitute the **Board of Studies in Computer Science** for framing the syllabi in Computer Science subject for all semesters under **single major system** duly following the norms of the UGC Autonomous guidelines 2018 and curriculum framework issued by UGC for single major system vide Ref.3 above.

S. No	Name	Designation
1	Suneel Kumar Duvvuri	Chairman
2	All Faculty members in the department	Member
3	R.V.Satyanarayana PR GOvt. College (A) Kakinada	Subject Expert
4	N. Sridhar GDC (A) Tuni	Subject Expert
5	Dr. V. Persis, ANUR	University Nominee
6	K. Vasantha Kumar Lead SAS Programmer B&P Team, Bangalore	Expert from Industry/Corporate Sector
7		Student Nominee

The above members are requested to attend the BOS meetings and share their valuable views, and suggestions on the following functionaries:

(a) Prepare syllabi for the subject keeping in view the objectives of the college, the interest of the stakeholders and national requirements for consideration and approval of the Academic Council
(b) Suggest methodologies for innovative teaching and evaluation techniques
(c) Suggest a panel of names to the Academic Council for the appointment of examiners

(d) Coordinate research, teaching, extension, and other activities in the department of the college.

The term of the members will be Two years from the date of issue of this proceedings. The Chairman of the BoS (HoD/lecturer In-Charge of the department) is directed to coordinate with the Principal of the College and conduct BoS meetings as and when necessary, but at least twice a year.

Note: For further information, please go through the guidelines provided by the Academic Cell of the College.

C. KRISHNA
PRINCIPAL
GOVERNMENT COLLEGE [A]
RAJAHMUNDRY

Copy to:
1. The above individuals
2. File

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

COMPOSITION OF BOARD OF STUDIES FOR THE YEAR 2023-2024

Chairman	Mr. D.Suneel Kumar, In-charge of the Department, DEPARTMENT OF COMPUTER SCIENCE Government College (A), Rajamahendravaram.
University Nominee	Associate Professor Department of Computer Science and Engineering University College of Engineering, Adikavi Nannaya
Subject Expert	R.V.Satyanarayana Lecturer in Computer science PR Govt. College (A) Kakinada
Subject Expert	N. Sridhar Lecturer in Computer science GDC (A) Tuni
Expert from Industry	K. Vasantha Kumar Lead SAS Programmer B&P Team, Bangalore
Members	
Smt U Sandhya Rani	Faculty Member
Mr Devaraju Hanumanthu	Faculty Member
Sri P. Narasinga Rao	Faculty Member
Sri. D. Seetha Ramulu	Faculty Member
Kum S.Jaya Lakshmi	Faculty Member
Smt B.Parameswari	Faculty Member
Smt Ch.Sujatha	Faculty Member
Smt N.Priyanka	Faculty Member
Smt M.Tejaswi	Faculty Member
Smt B Rupa Devi	Faculty Member
Smt N Jyothirami	Faculty Member
Ch. Jety	Student
D. Sai Bala	Student

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC with "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Board of Studies Dated: 30 August 2023

Meeting of the Board of studies is held at Digihub in the Department of Computer Science,Govt. College (A), Rajahmundry with the following agenda.

Agenda

- Curriculum Design for all the Semesters for B.Sc. (Honors)-Computer Science, B. Sc. (Honors) Artificial Intelligence
- Designing of Course Outcomes and Course Objectives
- Identifying /inclusion of components of Skill Development, Employability and Entrepreneurship inthe curriculum
- Additional inputs into the curriculum
- Designing Model Question Papers and identifying potential paper setters
- Innovative Teaching – Learning Methodology (Learner Centric)
- Curriculum for the Certificate Courses
- Academic activities of the Department
- Any other proposal with the permission of the chair

(Suneel Kumar Duvvuri)
CHAIRMAN
BOARD OF STUDIES

Minutes and Resolutions

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

CONSOLIDATED REPORT OF BOARD OF STUDIES FOR THE YEAR 2023-24

The Meeting Board of Studies of Computer Science & Applications department was convened on **30-08-2023** under the Chairmanship of Mr. Suneel Kumar Duvvuri Head / Lecturer-in-charge of Department of Computer Science and Applications. The following members are present

S.No.	Name	Designation	Signature
1	Dr. V. Persis	University Nominee	
2	Dr. N. Sridhar	Local Nominee	
3	Mr. R V Satyanarayana	Local Nominee	
4	Sri K. Vasantha Kumar	Industrial Nominee	
5	Smt U Sandhya Rani	Faculty Member	
6	Mr. Devaraju Hanumanthu	Faculty Member	
7	Sri P. Narasinga Rao	Faculty Member	
8	Sri. D. Seetha Ramulu	Faculty Member	
9	Kum S.Jaya Lakshmi	Faculty Member	
10	Smt B.Parameswari	Faculty Member	
11	Smt Ch.Sujatha	Faculty Member	
12	Smt N.Priyanka	Faculty Member	
13	Smt M.Tejaswi	Faculty Member	
14	Smt B Rupa Devi	Faculty Member	
15	Smt N Jyothirami	Faculty Member	
16	Ch. Jety	Student	
17	D. Sai Bala	Student	

Government College (Autonomous), Rajahmundry

(Accredited by NAAC "A+" Grade)

Board of Studies Meeting on Department of Computer Science & Applications

List of Paper Setters and Examiners

S No	Name of the Lecturer/Reader/Professor	Papers	College	City
1	Prof P Suresh Varma	ALL	Dept of CSE, AKNU	Rajahmundry
2	Dr V Persis	ALL	Dept of CSE, AKNU	Rajahmundry
3	Dr M Kamala Kumari	ALL	Dept of CSE, AKNU	Rajahmundry
4	Dr P Venkateswara Rao	ALL	Dept of CSE, AKNU	Rajahmundry
5	R V Satyanarayana	ALL	GDC (P R) KAKINADA	Kakinada
6	G Balavenkata Padmanadh	ALL	GDC Mummidivaram	Mummidivaram
7	Dr N Sridhar	ALL	GDC TUNI	Tuni
8	E Jyothikiranmayi	ALL	SCIM GDC Tanuku	Tanuku
9	Rebba Ashok Kumar	ALL	SCIM GDC Tanuku	Tanuku
10	Smt M Rajini	ALL	GDC Ravulapalem	Ravulapalem
11	Dr K Satya Rajesh	ALL	GDC Bantumalli	Bantumalli
12	Vijayadeep gummadi	ALL	GDC (SRR & CVR) VIJAYAWADA	Vijayawaada
13	T Jayakrishna	ALL	GDC (SRR & CVR) VIJAYAWADA	Vijayawaada
14	M. Arun Kumar	ALL	GDC Kovvur	Kovvur
15	Smt N Swarnajyothi	ALL	GDC Kaikaluru	Kaikaluru
16	U Sarala	ALL	GDC AVANIGADDA	Avanigadda
17	Dr A Sivaprasad	ALL	GDC TEKKALI	Tekkali
18	I Srilakshmi	ALL	GDC (W) SRIKAKULAM	Srikakulam
19	Sri B Raghuram	ALL	GDC SEETHAMPETA	Seethampeta
20	Sri B Srinivas	ALL	GDC (M) SRIKAKULAM	Srikakulam
21	Dr K V Sobha Rani	ALL	GDC Ramachandrapuram	GDC Ramachandrapuram
22	R Venakata phani Kumar	ALL	GDC Perumallapuram	Perumallapuram
23	G Satya suneetha	ALL	GDC Kovvuru	Kovvuru

24	Smt U Subhashini	ALL	GDC RAVULAPALEM	Ravulapalem
25	B Rajkumar	ALL	GDC (SRR & CVR) VIJAYAWADA	Vijayawada
26	B Hemaraju	ALL	GDC TEKKALI	Tekkali
27	P Jyothi	ALL	GDC PATHAPATNAM	Pathapatnam
28	S Vani Kumari	ALL	GDC (W) SRIKAKULAM	Pathapatnam
29	Simma Madhavi Latha	ALL	GDC (W) SRIKAKULAM	Pathapatnam
30	V Chandrasekhar	ALL	GDC SEETHAMPETA	Seethampeta
31	Smt J Sharmila Rani	ALL	GDC (M) SRIKAKULAM	Srikakulam
32	Smt K Anusha Devi	ALL	GDC PADERU	Paderu

Government College (Autonomous), Rajahmundry

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

SCHEME OF EVALUATION

MODEL OF SEMESTER END EXAMINATION QUESTION PAPER
(THEORY)
(As Approved in the BOS meeting held on 30 August 2023)

EVALUATION SCHEME

Standard Operating Procedure for Continuous Internal Assessment (Internal Marks – 50) The Internal marks in all the courses/subjects will be awarded based on continuous internal assessment made during the semester concerned. For each Courses/subject 50 marks are allotted for internal assessment and 50 marks are allotted for the End Semester Examination.

Continuous Internal Evaluation (CIA):

It has been decided to introduce Continuous Internal assessment marks for a total of 50 marks, which are to be distributed as follows:

S.No.	Component			Distributionof Marks
1	CIE I (after completion of 50% of syllabus)			20
2	CIE II (Online Exam)			10
3	ATTENDANCE	Above 95%	5	5
		91% to 95%	4	
		86% to 90%	3	
		81% to 85%	2	
		75% to 80%	1	
		Below 75%	0	
Pedagogical Strategies				
4	Assignment			5
5	Participation or Paper Presentation in Student Seminars/Workshops/GroupDiscussions/ Quiz/ Student Study Project/Field Visit/Survey			5
6	Viva-voce			5
TOTAL				**50**

Component I : CIE I & CIE II (20+10 = 30 Marks)

Two Internal Examinations, out of which one is Mandatorily Online examination, for each Course shall be conducted for assessment. These examinations will be conducted during August/September (CIE –I) and January/February (CIE-II). CIE-I carries 20 marks and CIE-II carries 10 marks. CIE- I will be conducted after completion of 50% of syllabus. The second internal examination, i.e., CIE – II, which is mandatorily online examination will cover the entire syllabus and consists of 20 multiple choice questions having ½ mark for each question. The sum of both the CIEs will be considered for awarding marks for CIA.

Suggestive Question Paper Pattern for CIE I & CIE II (Based on Blooms Taxonomy):

Though the faculty concerned is empowered to adopt their own pattern for question paper, a generaland suggestive model for question paper is given below based on Blooms Taxonomy.

Q No	Learning Objective	Marks
1	Memory based (Remember)	2
2	Understand (Comprehension)	2
3	Application	3
4	Analysis	3
5	Evaluation	5
6	Creativity	5
	TOTAL	20 marks

The active verbs used to frame the question based on Blooms Taxonomy is given below for the convenience.

Active verbs developed based on Bloom's Taxonomy

Knowledge	Understand	Apply	Analyze	Evaluate	Create
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize
recall	convert	complete	order	convince	integrate
reproduce	demonstrate	construct	point out	defend	modify
tabulate	estimate	dramatize	prioritize	estimate	organize
tell	express	interpret	subdivide	find errors	prepare
copy	Identify	Manipulate	survey	grade	produce
discover	indicate	Paint	advertise	measure	rearrange
duplicate	Infer	Prepare	appraise	predict	rewrite
enumerate	relate	produce	Break down	rank	role-play

CIE II will consist of multiple choice questions (MCQs). Number of questions and distribution of marks is at the discretion of the faculty concerned. However, a half an hour exam consisting of 20 MCQs with ½ mark for each question is suggestible in view of the huge number of students. All the HoDs should supply a question bank of MCQs of all the courses covering the entire syllabus along with key to the Computer Science department to enable them to conduct the online examination in the designated laboratories. Alternatively, all the HoDs may upload the MCQs in the portal through their logins.

Further, all the HoDs should submit their schedule of CIE II to IQAC in advance to monitor the systematic conduct of the online examination.

Important Note:

Students who absent themselves from any CIE will lose the marks for the respective test. However, if a student is not able to write the CIE I / II because of his/her participation in an important event related to NSS/NCC or Games/Sports representing the College/University/health grounds, the student has to get the prior permission of the Principal through the proper channel and submit the same to the Office of the Controller of Examinations. Deadline is 7 days after the CIE. Applications submitted after the deadline will not be considered for the retest.

Component III: Attendance (5 Marks)

Attendance mark will be awarded to the students based on their attendance percentage on a particular course. Faculty of each course has to award the attendance mark based on their subject attendance. The

marks split-up is given below

Above 95%	5
91% to 95%	4
86% to 90%	3
81% to 85%	2
75% to 80%	1
Below 75%	0

Component IV: Assignment (5 Marks)

One Assignment for each course must be submitted by a student in each semester. The marks allotted to this component will be awarded based on the performance of the student. The assignment topic may be assigned either individually or group. Assignment should be submitted by the student in the first half of the semester. Also maximum of 7 days should be given to students to submit the assignment. Assignments should be evaluated by the faculty concerned and the same to be verified by the student. The assignment should be kept in department for the Academic Audit by IQAC and also for external academic audit conducted by office of Commissionerate of Collegiate Education. The marks should be awarded by the faculty.

Component V (Pedagogical Strategies):

Participation /Paper Presentation in Student Seminars/Workshops/Group Discussions/ Quiz/ Student Study Project/Field Visit/Survey (5 Marks)

For this component, the marks will be provided to student, if he/she participate/win in the external college technical events. To score marks, the student has to participate / present papers related to subject in the technical events organized in the other colleges/other departments in the college.

	Participation	Second Prize	First Prize / Best Paper
Workshop / Seminar / Technical Symposium	2	3	5
National / International Conference	3	4	5

In case of Classroom seminar, one seminar for each course must be presented by a student in each semester. Each student should be given individual topic for seminar, the student has to submit the seminar topic as assignment and the same will be presented minimum of 10 minutes in the class through ICT. The seminar presented by the student should be evaluated by the subject faculty and

based on the performance of the presentation, the marks will be awarded.

Similarly, reports on field visits, educational tours, study projects in prescribed format will be considered for awarding marks in this component.
For a student who has not participated in any events in that semester, the student will be awarded "0" for this component. If a student participates more than one event and win prize, the best would be considered for the subject.

In case of Quiz, preferably online quiz, it should be conducted after the CIE II and well before the SEE. Faculty concerned has to announce the schedule for the quiz and create the quiz in the ERP (College Management System). The subject staff has to upload all the questions (unit-wise) in the ERP. Quiz should be created with 30 questions (ERP should choose 30 questions randomly out of 100 questions uploaded).The timing for quiz should be 30 minutes. No negative marking. Each question carries 1 mark. The marks secured should be converted to5.

Semester End Examinations (SEE)

The question paper is of 2 ½ duration for 50 marks. The suggestive question paper model given in section 1.1.1.may be used for framing the question. This kind of question paper will be helpful in CO-PO Mapping and thereby graduate attributes.
(Prepared by IQAC & Academic Cell and submitted to the Chairman, IQAC & Principal on 3 April 2019)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

SCHEME OF VALUATION FOR PRACTICAL EXAMINATIONS

(As Approved in the BOS meeting held on 30 August 2023 For 2023-2024)

S.No.	Description	Marks
1	Procedure Explanation with Coding (including Algorithm & Flowchart if any)	20
2	Execution of Program	10
3	VIVA VOCE	10
4	RECORD **	10
5	EXTERNAL PRACTICAL EXAM (at the end of II, IV& VI Semester)	50
6	Internal Practical Exam (At the end of I, III & V Semester)	50
	GRAND TOTAL	**100**

** Award of marks for number of practicals recorded in the Record.

10 Practicals and Above	10
8 Practicals	8
6 Practicals	6
5 Practicals	5
Less than 5	0

B.Sc. (Honors) Computer Science

Program Specific Outcomes (PSOs)

After completion of the program, the student is able to

PSO1: Problem Solving Proficiency: Proficiently analyze intricate problems, identify requirements, and implement efficient algorithms using appropriate programming languages.

PSO2: Expert Software Development: Expertly design software, architect systems, and develop solutions with an emphasis on scalability, user experience, and best practices.

PSO3: Specialized Knowledge Application: Apply specialized knowledge in areas such as AI, data science, cyber security, contributing to practical problem-solving and innovative solutions.

PSO4: Effective Communication and Collaboration: Communicate technical concepts effectively and collaborate proficiently within multidisciplinary teams, demonstrating leadership and teamwork skills.

Credit Framework

B.Sc (Honours) with Single Major

Semester	Major* (4 Cr)			Minor (4 Cr)			AECC (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**																							
																			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																								

Total Credits Required for Certificate in Computer Science : 46
Total Credits Required for Diploma in Computer Science with a Minor: 98
Total Credits Required for Degree in Computer Science : 136
Total Credits Required for Hons Degree in Computer Science: 180

Courses offered in the Program										
S No	Sem	Course Code	Course type	Title of the Course	CIA	SEE	Hours/week			
							L	T	P	C
1	I	125701	Major (Multidisciplinary)	Essentials and applications of mathematical, Physical and Chemical sciences	50	50	3	2		4
2	I	125702	Major (Multidisciplinary)	Advances in Mathematical, Physical and Chemical Sciences	50	50	3	2		4
3	II	225701	Major/Minor	Problem Solving using C	50	50	3			3
4	II	225701P	Major/Minor	Problem Solving using C Lab		50			2	1
5	II	225702	Major	Digital Logic Design	50	50	3			3
6	II	225702P	Major	Digital Logic Design Lab		50			2	1
7	III	325701	Major/Minor	Object Oriented Programming using Java	50	50	3			3
8	III	325701P	Major/Minor	Object Oriented Programming using Java Lab		50			2	1
9	III	325702	Major	Data Structures using C	50	50	3			3
10	III	325702P	Major	Data Structures using C Lab		50			2	1
11	III	325703	Major	Computer Organization	50	50	3			3
12	III	325703P	Major	Computer Organization Lab		50			2	1
13	III	325704	Major	Operating Systems	50	50	3			3
14	III	325704P	Major	Operating Systems Lab		50			2	1
15	IV	425701	Major/Minor	Database Management System	50	50	3			3
24	IV	425701P	Major/Minor	Database Management System Lab		50			2	1
17	IV	425702	Major/Minor	Object Oriented Software Engineering	50	50	3			3
18	IV	425702P	Major/Minor	Object Oriented Software Engineering Lab		50			2	1
19	IV	425703	Major	Data Communications and Computer Networks	50	50	3			3
20	IV	425703P	Major	Data Communications and Computer Networks Lab		50			2	1
Note	*Students of Major Discipline have to Opt 2 Pairs (A&B or B&C or A&C) out of the 3 Pairs of courses (A, B, C) given.* *Students of Minor Discipline have to choose 1 Pair (either A or B or C) in Semester V*									
21	V	525701	Major/Minor SET-A	Web Interface Designing Technologies	50	50	3			3
22	V	525701P		Web Interface Designing Technologies Lab		50			2	1
23	V	525702		Web Applications Development using PHP &	50	50	3			3

				MYSQL						
24	V	525702P		Web Applications Development using PHP & MYSQL Lab		50			2	1
25	V	525703	Major/Minor SET-B	Internet of Things	50	50	3			3
26	V	525703P		Internet of Things Lab		50			2	1
27	V	525704		IoT Applications Development and Programming	50	50	3			3
28	V	525704P		IoT Applications Development and Programming Lab		50			2	1
29	V	525705	Major/Minor SET-C	Foundations of Data Science	50	50	3			3
30	V	525705P		Foundations of Data Science Lab		50			2	1
31	V	525706		Application development using Python	50	50	3			3
32	V	525706P		Application development using Python Lab		50			2	1

Major Courses in Semester VII & VIII

S.No	Sem	Course Code	Course type	Title of the Course	CIA	SEE	Hours/week			
							L	T	P	C
Semester VII Higher Order Thinking Courses										
1	VII	725701	Major	Advanced Data Structures	50	50	3			3
2	VII	725701P	Major	Advanced Data Structures Lab		50			2	1
3	VII	725702	Major	Artificial Intelligence	50	50	3			3
4	VII	725702P	Major	Artificial Intelligence Lab		50			2	1
5	VII	725703	Major	Computer Graphics	50	50	3			3
6	VII	725703P	Major	Computer Graphics Lab		50			2	1
7	VII	725704	Major	Design and Analysis of Algorithms	50	50	3			3
8	VII	725704P	Major	Design and Analysis of Algorithms Lab		50			2	1
9	VII	725705	Major	Principles of Machine Learning	50	50	3			3
10	VII	725705P	Major	Principles of Machine Learning Lab		50			2	1
11	VII	725706	Major	Software Testing	50	50	3			3
12	VII	725706P	Major	Software Testing Lab		50			2	1
Semester VII Skill Based Courses										
13	VII	725707	Major	Advanced Java Programming	50	50	3			3
14	VII	725707P	Major	Advanced Java Programming Lab		50			2	1
25	VII	725708	Major	MEAN Stack Development	50	50	3			3
16	VII	725708P	Major	MEAN Stack Development Lab		50			2	1
17	VII	725709	Major	Mobile Application Development	50	50	3			3
18	VII	725709P	Major	Mobile Application Development Lab		50			2	1
19	VII	725710	Major	R Programming	50	50	3			3
20	VII	725710P	Major	R Programming Lab		50			2	1

Note: Student has to Choose Any three Courses out of Six from Higher Ordered Thinking Courses and Two Courses out of four from Skill Based Courses

S No	Sem	Course Code	Course type	Title of the Course	CIA	SEE	Hours/week			
							L	T	P	C
Semester VIII Higher Order Thinking Courses										
1	VIII	825701	Major	Big Data Technologies	50	50	3			3
2	VIII	825701P	Major	Big Data Technologies Lab		50			2	1
3	VIII	825702	Major	Compiler Design	50	50	3			3
4	VIII	825702P	Major	Compiler Design Lab		50			2	1
5	VIII	825703	Major	Data Mining Concepts & Techniques	50	50	3			3
6	VIII	825703P	Major	Data Mining Concepts & Techniques Lab		50			2	1
7	VIII	825704	Major	Digital Image Processing	50	50	3			3
8	VIII	825704P	Major	Digital Image Processing Lab		50			2	1
9	VIII	825705	Major	Information Security and Cryptography	50	50	3			3
10	VIII	825705P	Major	Information Security and Cryptography Lab		50			2	1
11	VIII	825706	Major	Mobile ADHOC and Sensor Networks	50	50	3			3
12	VIII	825706P	Major	Mobile ADHOC and Sensor Networks Lab		50			2	1
Semester VIII Skill Based Courses										
14	VIII	825707	Major	Advanced DBMS	50	50	3			3
15	VIII	825707P	Major	Advanced DBMS Lab		50			2	1
24	VIII	825708	Major	Cloud Computing	50	50	3			3
17	VIII	825708P	Major	Cloud Computing Lab		50			2	1
18	VIII	825709	Major	Computer Vision	50	50	3			3
19	VIII	825709P	Major	Computer Vision Lab		50			2	1
20	VIII	825710	Major	Digital Forensics	50	50	3			3
21	VIII	825710P	Major	Digital Forensics Lab		50			2	1

Note: Student has to Choose Any three Courses out of Six from Higher Ordered Thinking Courses and Two Courses out of four from Skill Based Courses

SEMESTER-I

Course Code	Title of the Course	L	T	P	C
125701	**Essentials And Applications of Mathematical Physical and chemical Sciences**	3	2		4
Prerequisites	Basic Mathematics, Physics, Chemistry				

Course Objectives

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.
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
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.
CO4	Understand the interplay and connections between mathematics, physics, and chemistry invarious applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
CO5	To explore the history and evolution of the Internet and to gain an understanding of network securityconcepts, including threats, vulnerabilities, and countermeasures.

Syllabus

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 andproblems

Statistical Measures: Mean, Median, Mode of a data and problems

---

Activity:

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 analyze the central tendencies and distribution of the data.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

UNIT –II

ESSENTIALS OF PHYSICS:

Definition and Scope of Physics- Measurements and UNIT-s - Motion of objects: Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions- Behaviour of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Theories and understanding of universe.

Activity:

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.

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

Evaluation Method: Objective-based quiz assessing knowledge and understanding

UNIT –III

ESSENTIALS OF CHEMISTRY:

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

Activity:

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 analyze 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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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UNIT –IV

APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY:

Applications of Mathematics in Physics & Chemistry: Calculus, Differential Equations & Complex Analysis

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, Materials Science, Food and Beverage Industry.

Activity:

1: Interdisciplinary Case Studies

- Divide students into small groups and provide them with interdisciplinary case studies that involve theinterdisciplinary application of mathematics, physics, and chemistry.
- Each case study should present a real-world problem or scenario that requires the

integration ofconcepts 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, analyzing the behavior of electrical circuits, or measuring the properties of materials.

. 4: Mathematical Modeling

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

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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UNIT- –V

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

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

---

Activity:

- Identifying the attributes of network (Topology, service provider, IP address and

bandwidth of your college network) and prepare a report covering network architecture.

- Identify the types of malwares and required firewalls to provide security.
- Latest Fraud techniques used by hackers. Structured Programming Assignment

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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Text Books:

1. Essentials And Applications of Mathematical, Physical and Chemical Sciences: *HK Dass, PS Hemne, RL Madan, Rama Verma, Rajnish Verma, Suneel K Duvvuri*. S.Chand Publications-2023
2. Functions of one complex variable by John.B.Conway, Springer- Verlag.
3. Elementary Trigonometry by H.S.Hall and S.R.Knight
4. 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

Reference Books

1. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway and John W. Jewett Jr.
2. Physics for Technology and Engineering" by John Bird
3. Chemistry in daily life by Kirpal Singh
4. Chemistry of bio molecules by S. P. Bhutan
5. Fundamentals of Computers by V. Raja Raman
6. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

Web Links:

1. https://archive.nptel.ac.in/courses/111/105/111105121/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

I B.Sc. Semester-I

Essentials and Applications of Mathematical, Physical and Chemical Sciences

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. Q1
2. Q2
3. Q3
4. Q4
5. Q5
6. Q6
7. Q7
8. Q8

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Q9

(OR)

10. Q10

11. Q11

(OR)

12. Q12

13. Q13

(OR)

14. Q14

15. Q15

(OR)

16. Q16

17. Q17

(OR)

18. Q18

Course Code	Title of the Course	L	T	P	C
125702	**Advances in Mathematical, Physical and Chemical Sciences**	3	2		4
Prerequisites	Basic Knowledge in Mathematics, Physics & Chemistry				

Course Objectives

1. 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.

2. The course aims to broadenstudents' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

Course Outcomes:

On Completion of the course, the students will be able to-	
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.
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.
CO3	Understand the different sources of renewable energy and their generation processes and advances in Nano materials 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.
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 nano sensors. Explore the effects of chemical pollutants on ecosystems and human health.
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 to explain and predict phenomena in different contexts.

Syllabus

UNIT - I

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 onproduct 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

---

Activity:

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 ofintersection.

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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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UNIT- –II

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.

Activity:

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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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UNIT- –III

ADVANCES IN CHEMISTRY:

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

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Activity:

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.

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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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UNIT- –IV

ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS &CHEMISTRY

Mathematical Modeling applications in physics and chemistry Application of Renewable energy: Grid Integration and Smart Grids

Application of nanotechnology: Nano medicine

Application of biophysics: Biophysical Imaging, Biomechanics, Neuro physics

Application of medical physics: Radiation Therapy, Nuclear medicine Solid waste management, Environmental remediation- Green Technology, Water treatment.

Activity:

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 modeling 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.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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UNIT- –V

Advanced Applications of computer Science

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.

Activity:

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

1. Identify the networking media used for your college network
2. Identify all the networking devices used in your college premises.

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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Text Books:

1. Advances of Mathematical, Physical and ChemicalSciences: *HK Dass, PS Hemne, RL Madan, Rama Verma, Rajnish Verma, Suneel K Duvvuri.* S Chand Publications - 2023
2. Coordinate Geometry by S.L.Lony, Arihant 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

Reference Books

1. Environmental Chemistry by Anil.K.D.E.
2. Digital Logic Design by Morris Mano
3. Data Communication & Networking by Bahrouz Forouzan.
4. Functions of one complex variable by John.B.Conway, Springer- Verlag.
5. Elementary Trigonometry by H.S.Hall and S.R.Knight
6. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd. 4.Basic Statistics by B.L.Agarwal, New age international Publishers
7. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
8. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker

Web Links:

1. https://archive.nptel.ac.in/courses/111/105/111105121/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
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2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

I B.Sc. Semester-I

Advances in Mathematical, Physical and Chemical Sciences

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE Questions **5 X 3= 15M**

1. Q1
2. Q2
3. Q3
4. Q4
5. Q5
6. Q6
7. Q7
8. Q8

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Q9

(OR)

10. Q10

11. Q11

(OR)

12. Q12

13. Q13

(OR)

14. Q14

15. Q15

(OR)

16. Q16
17. Q17

(OR)

18. Q18

SEMESTER-II

Course Code	Title of the Course	L	T	P	C
225701	**Problem Solving using C**	3			3
Prerequisites	Basic Computer Knowledge				

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:

On Completion of the course, the students will be able to-	
CO1	Appreciate and understand the working of a digital computer
CO2	Analyze a given problem and develop an algorithm to solve the problem
CO3	Improve upon a solution to a problem
CO4	Use the 'C' language constructs in the right way
CO5	Design, develop and test programs written in 'C'

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, Concepts of Machine level, Assembly level and high-level programming, 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-Formatted and Unformatted I/O

Activity: Quiz on computer hardware and software concepts

Evaluation Method: Objective-based quiz assessing knowledge and understanding

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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 and goto.

Activity: Problem-solving using Decision-Making Statements

Evaluation Method: Correctness of decision-making logic

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, Character handling functions

---

Activity: Pair Programming Exercise on Functions

Evaluation Method: Collaboration and Code Quality

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.

Activity: Pair Programming Exercise on Functions

Evaluation Method: Collaboration and Code Quality

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.

Activity: Structured Programming Assignment

Evaluation Method: Appropriate use of structures and nested structures

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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: 9770070411838, 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:978-8183332430,656 pages.

Web Links:

1. https://nptel.ac.in/courses/106/104/106104128/
2. https://nptel.ac.in/courses/106/105/106105171/

3. https://data-flair.training/blogs/c-tutorial/
4. https://www.programiz.com/c-programming

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
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GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

I B.Sc. Semester-II

Problem Solving using C

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain about structure of C program.
2. Write a short note on types of soft wares.
3. Write a short note on break and continue statements.
4. Explain about goto statement with example.
5. Explain about Array declaration and initialization with example.
6. Explain any three character handling functions.
7. Explain about recursive functions.
8. Explain about differences between structures and unions.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about block diagram of a computer and functions of a computer.

(OR)

10. Explain about data types in C.

11. Explain about Decision making statements with examples.

(OR)

12. Explain about loop control statements in C.

13. Explain about two dimensional arrays with example program.

(OR)

14. What is a string? Explain various string handling functions available in C.

15. Explain about call by value and call by reference mechanism with example.

(OR)

16. Explain about storage classes in C.

17. Explain about Dynamic memory management in C.

(OR)

18. Explain about structures and accessing structure members in C with example program.

Course Code	Title of the Course	L	T	P	C
225701P	**Problem Solving using C Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. Learn how to solve common types of computing problems.
2. Learn to map problems to programming features of C.

List of Experiments/Syllabus:

1. A. Write a Program to calculate simple & compound interest
   B. Write a C Program to interchange two numbers.
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

Reference Books:

1. Henry Mullish&Huubert L.Cooper: The Spirit of C An Introduction to modern Programming, Jaico Pub. House,1996.
2. Y kanithkar, let us C BPB, 13 th edition-2013, ISBN:978-8183332430,656 pages.

Virtual Lab Links:

1. https://cse02-iiith.vlabs.ac.in/

Course Code	Title of the Course	L	T	P	C
225702	**Digital Logic Design**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives

1. To familiarize with the concepts of designing digital circuits.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand how to Convert numbers from one radix to another radix and perform arithmetic operations.
CO2	Simplify Boolean functions using Boolean algebra and k- maps
CO3	Design adders and subtractors circuits
CO4	Design combinational logic circuits such as decoders, encoders, multiplexers and demultiplexers.
CO5	Use flip flops to design registers and counters.

Syllabus:

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, weighted and un-weighted codes.

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

Evaluation Method: Communication Skills and Knowledge Presentation

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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.

Activity: Boolean Algebra Assignment

Evaluation Method: Assignment Completion and Correctness

UNIT –III

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

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

Evaluation Method: Lab Performance and Correctness of Circuit Implementation

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UNIT –IV

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

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

Evaluation Method: Participation and Critical Thinking

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, design of ripple counters, synchronous counters and variable modulus counters.

Activity: Quiz on Flip-Flops and Register-Counter Design

Evaluation Method: Quiz Performance and Knowledge Retention

Text Books:

1. M. Morris Mano, Michael D Ciletti, "Digital Design", 5th edition, PEA.
2. Kohavi, Jha, "Switching and Finite Automata Theory", 3rd edition, Cambridge.

Reference Books

1. Leach, Malvino, Saha, "Digital Principles and Applications", 7th edition, TMH.
2. Roth, "Fundamentals of Logic Design", 5th edition, Cengage.

Web Links:

1. https://nptel.ac.in/courses/106105243

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

I B.Sc. Semester-II

Digital Logic Design

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain about r's Complement and (r-1)'s complement.
2. Convert $(45)_{10}$ to binary and hexa decimal number.
3. Write a short note on Universal gates.
4. Write a truth table for X-NOR and X-OR gates.
5. Write a short note on half subtractor.
6. Write a short note on half adder.
7. Write a short note on decoders with example.
8. Write a short note on multiplexer with example.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain in detail about weighted and weighted codes.

(OR)

10. Binary, octal, decimal, hexadecimal number systems.

11. Explain about Product of Sums and Sum of Products with example.

(OR)

12. Explain Boolean laws and theorems.

13. Explain about ripple adder/subtractor with example

(OR)

14. Explain about Full adder and full subtractor with example.

15. Design 3 X 8 decoder with two 2 X 4 decoders.

(OR)

16. Design 4 X 1 and 8 X 1 multiplexer with examples.

17. Explain about RS Flip Flop and JK Flip Flop with example.

(OR)

18. Explain about Bidirectional shift register and universal shift register with example.

Course Code	Title of the Course	L	T	P	C
225702P	**Digital Logic Design Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. To prepare students to perform the analysis and design of various digital electronic circuits.

List of Experiments/Syllabus:

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.

Reference Books:

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

Virtual Lab Links:

1. http://mddl-iitb.vlabs.ac.in/

SEMESTER-III

Course Code	Title of the Course	L	T	P	C
325701	**Object Oriented Programming using Java**	3			3
Prerequisites	C Programming				

Course Objectives

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

Course Outcomes

On Completion of the course, the students will be able to-	
CO1	Understand the basic concepts of Object-Oriented Programming and Java Program Constructs
CO2	Implement classes and objects and analyze Inheritance and Dynamic Method Dispatch
CO3	Demonstrate various classes in different packages and can design own packages
CO4	Manage Exceptions and Apply Threads
CO5	Create GUI screens along with event handling

Syllabus:

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

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

Evaluation Method: Quiz Performance and Knowledge Retention

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;

Activity: Object-Oriented Programming Assignment: Class Implementation

Evaluation Method: Assignment Completion and Correctness

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, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes.

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

Evaluation Method: Lab Performance and Correctness of Code Implementation

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UNIT –IV

Multithreading: Differences between multiple processes and multiple threads, thread states, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.

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, The Console class, Serialization

---

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

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

UNIT –V

GUI Programming with Swing- Introduction, MVC architecture, components, containers. Understanding Layout Managers - Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

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

Activity: GUI design contest using Java Swings

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

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.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
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		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. Semester-III

Object Oriented Programming using Java

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain a short note on type conversion and type casting.
2. Write a short note on scope and lift time of a variables in Java.
3. Write a short note "this" and "super" keyword in Java.
4. Explain a short note on command online arguments in Java.
5. Explain about Array declaration and initialization with example.
6. Explain any three character handling functions.
7. Explain about recursive functions.
8. Explain about differences between structures and unions.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Object Oriented concepts in Java.

(OR)

10. Explain about data types and operators in Java.

11. Explain about Method overloading and method overriding in Java.

(OR)

12. Explain Inheritance and types of Inheritance with example.

13. Explain about Interfaces in Java.

(OR)

14. Explain about exception handling techniques in Java.

15. Explain about Interthread communication in Java.

(OR)

16. Explain about byte streams and character streams in Java.

17. Explain about Layout managers in Java.

(OR)

18. Explain about Keyboard event handling technique in Java with example program.

Course Code	Title of the Course	L	T	P	C
325701P	**Object Oriented Programming using Java Lab**			2	1
Prerequisites	C Programming				

Objectives

1. Design & implement object-oriented programming concepts in Java.

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
8. i. Single ii. Multi-Level iii. Hierarchical iv. Hybrid
9. Write a java program to implement runtime polymorphism.
10. 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.
11. 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.
12. 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.
13. Implement a Java program for handling mouse events when the mouse entered, exited, clicked, pressed, released, dragged and moved in the client area.

14. Implement a Java program for handling key events when the key board is pressed, released, typed.
15. 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.
16. Write a Java program to design student registration form using Swing Controls. The form which having the following fields and button SAVE
17. Form Fields are: Name, RNO, Mailid, Gender, Branch, Address.

Reference Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill.

Virtual Lab Links:

1. **https://java-iitd.vlabs.ac.in/**

Course Code	Title of the Course	L	T	P	C
325702	**Data Structures Using C**	3			3
Prerequisites	C Programming				

Course Objectives

1. 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:

On Completion of the course, the students will be able to-	
CO1	Understand various Data Structures for data storage and processing.
CO2	Realize Linked List Data Structure for various operations
CO3	Analyze step by step and develop algorithms to solve real world problems by implementing Stacks, Queues data structures.
CO4	Understand and implement various searching & sorting techniques.
CO5	Understand the Non-Linear Data Structures such as Binary Trees and Graphs

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

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), Difference between Abstract Data Types, Data Types, and Data Structures.

Arrays-Concept of Arrays, Single dimensional array, Two dimensional array, Operations on arrays with Algorithms (searching, traversing, inserting, deleting)

Activity: Algorithm analysis exercises

Evaluation Method: Programming Assignment and Correctness

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;

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

---

Activity: Presentations on real-life applications of linked lists

Evaluation Method: Presentation skills or reports

UNIT –III

Stacks: Introduction to stack ADT, Representation of stacks with array and Linked List, Implementation of stacks, Application of stacks - Polish Notations - Converting Infix to Post Fix Notation - Evaluation of Post Fix Notation - Tower of Hanoi, 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

---

Activity: Role-playing activities for stack operations

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

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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

---

Activity: Sorting algorithm analysis and comparison activities

Evaluation Method: Performance analysis and presentation.

UNIT –V

Binary Trees: Concept of Non- Linear Data Structures, Introduction Binary Trees, Types of 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.

Activity: Case Study on Applications of Graphs

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

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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.

Web Links:

1. https://nptel.ac.in/courses/106102064

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. Semester-III

Data Structures Using C

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on Asymptotic notation.
2. Write a short note on space complexity and time complexities with examples.
3. Write the differences between Arrays and Linked List.
4. Explain applications of Linked List.
5. Explain about recursion, advantages and disadvantages of recursion.
6. Explain about applications of stack.
7. Explain about Bubble sort with example.
8. Explain about Linear search with example.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about types of data structures with examples.

(OR)

10. Explain about operations of an Array with examples.

11. Explain about double Linked List and its operations.

(OR)

12. Explain Circular Linked List with example.

13. Explain about Towers of Hanoi algorithm with example.

(OR)

14. Explain about Queue data structure and its operations.

15. Explain about Quick sort algorithm with example.

(OR)

16. Explain about Indexed Sequential search with example.

17. Explain about Binary Tree Traversal algorithms.

(OR)

18. Explain Breadth First Search and Depth First Search algorithms with examples.

Course Code	Title of the Course	L	T	P	C
325702P	**Data Structures Using C Lab**			2	1
Prerequisites	C Programming				

Objectives:

1. Able to implement efficient algorithms using various data structures.

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

Reference Books:

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

Virtual Lab Links:

1. https://cse01-iiith.vlabs.ac.in/

Course Code	Title of the Course	L	T	P	C
325703	**Computer Organization**	3			3
Prerequisites	Digital Logic design				

Course Objectives

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Identify different types of instructions
CO2	Differentiate between micro-programmed and hard-wired control units.
CO3	Analyse the performance of hierarchical organization of memory.
CO4	Summarize different data transfer techniques.
CO5	Demonstrate arithmetic operations on fixed- and floating-point numbers and illustrate concepts of parallel processing.

Syllabus:

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.

Activity: Quiz competition on micro-operations.

Evaluation Method: Accuracy and speed in answering quiz questions.

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.

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

Evaluation Method: Accuracy and speed in completing the puzzle.

UNIT –III

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

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

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

UNIT –IV

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

Activity: I/O Troubleshooting Challenge

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

UNIT –V

Computer Arithmetic and Parallel Processing: Data representation- fixed point, floating point, addition and subtraction, multiplication and division algorithms.

Parallel Processing-Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline.

Activity: Case Study on Parallel processing architecture.

Evaluation Method: Understanding of parallel processing concepts and architectures.

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.

Web Links:

1. https://nptel.ac.in/courses/106105243

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%

4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. Semester-III

Computer Organization

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on Instruction Cycle.
2. Write a short note on interrupts.
3. Write a short note on address sequencing.
4. Write a short note on memory hierarchy.
5. Write a short note on memory hierarchy.
6. Write a short note on Main memory.
7. Write a short note on peripheral devices.
8. Write a short note Instruction pipe line.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Arithmetic Logic Shift Unit.

(OR)

10. Explain about Memory reference instructions.

11. Explain about addressing modes.

(OR)

12. Explain about control memory.

13. Explain about cache memory and mappings.

(OR)

14. Explain about Associative memory.

15. Explain about Asynchronous data transfer modes.

(OR)

16. Explain about Priority Interrupt.

17. Explain about Multiplication and division algorithms.

(OR)

18. Explain about Addition and Subtraction algorithm.

Course Code	Title of the Course	L	T	P	C
325703P	**Computer Organization Lab**			2	1
Prerequisites	Digital Logic Design				

Objectives:

1. To develop applications using Assembly language code, familiarizes with open-source assembler.

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.

Reference Books:

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

Virtual Lab Links:

1. https://coa-iitkgp.vlabs.ac.in/

Course Code	Title of the Course	L	T	P	C
325704	**Operating Systems**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Demonstrate knowledge and comprehension of operating system functions.
CO2	Analyze different process scheduling algorithms and apply them to manage processes and threads effectively
CO3	Create strategies to prevent, detect, and recover from deadlocks, and design solutions for inter-process communication and synchronization problems.
CO4	Compare and contrast different memory allocation strategies and evaluate their effectiveness
CO5	Evaluate disk scheduling algorithms while implementing OS security measures

Syllabus:

UNIT –I

What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

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 –II

Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling- Non-Preemptive and Preemptive Scheduling Algorithms.

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 –III

Process Management: Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

Activity: Assignment on Dead Lock prevention techniques

Evaluation Method: Understanding, Completion and report.

UNIT –IV

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

Activity: Debate on various Memory allocation schemes

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

UNIT –V

File and I/O Management, OS security: Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Disk Scheduling algorithms.

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.

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)

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105214/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. Semester-III

Operating Systems

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on work station and hand held devices.
2. Write a short note on history of Operating System.
3. Write a short note on system calls.
4. Write a short note on thread libraries.
5. Write a short note on semaphores.
6. Write a short note on necessary conditions for deadlock.
7. Write a short note on Physical and Virtual address space.
8. Write a short note pipes.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about types of Operating Systems.

(OR)

10. Explain about functions of operating systems.

11. Explain about preemptive scheduling algorithms.

(OR)

12. Explain about non preemptive scheduling algorithms.

13. Explain Dead lock avoidance algorithm.

(OR)

14. Explain methods of Inter process communication.

15. Explain about paging and segmentation techniques with examples.

(OR)

16. Explain virtual memory concept with examples.

17. Explain about disk scheduling algorithms.

(OR)

18. Explain File allocation methods with example.

\

Course Code	Title of the Course	L	T	P	C
325704P	**Operating Systems Lab**			2	1
Prerequisites	C Programming				

Objectives:

1. Simulates various functions of an operating system like memory management, process management, device management, etc.

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 turnaround time of each process using the following CPU Scheduling algorithm for the given process schedules.
    a) FCFS
    b) SJF
    c) Priority
    d) Round Robin
2. Simulate MVT and MFT memory management techniques
3. Write a Program for Bankers Algorithm for Dead Lock Avoidance
4. Implement Bankers Algorithm Dead Lock Prevention.
5. Write a Program to simulate Producer-Consumer problem.
6. Simulate all Page replacement algorithms.
    e) FIFO

f) LRU

g) LFU

h) Optimal

7. Simulate Paging Techniques of memory management

8. Simulate the following disk scheduling algorithms

a) FCFS

b) SSTF

c) SCAN

d) CSCAN

Reference Books:

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

Virtual Lab Links:

1. https://naim30.github.io/OS-virtual-lab/

SEMESTER-IV

Course Code	Title of the Course	L	T	P	C
425701	**Database Management Systems**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives:

1. To familiarize with concepts of database design

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Differentiate between database systems and file based systems
CO2	Design a database using ER model
CO3	Use relational model in database design
CO4	Use SQL commands for creating and manipulating data stored in databases.
CO5	Write PL/SQL programs to work with databases.

Syllabus:

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, costs and risks of database approach.

Activity: Seminar Presentation on Database Management Systems

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

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.

Activity: Case Study on EER model

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

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, relational calculus, tuple relational calculus, domain relational Calculus (DRC), Functional dependencies and normal forms upto 3rd normal form.

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 –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, View, Sub Query.

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 –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.

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.

Text Books:

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

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.

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105175/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. Semester-IV

Database Management Systems

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on Data, Information, Database with examples.
2. Write a short note on Drawbacks of file-Based System.
3. Write a short note on generalization and specialization.
4. Write a short note on attribute set classification.
5. Write a short note on tuple relational calculus.
6. Write a short note on advantages of relational algebra.
7. Write a short note on aggregation functions in SQL.
8. Explain structure of PL/SQL.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about components of Data Base Management Systems.

(OR)

10. Explain classification of Data Base Management Systems.

11. Explain about relationship degree and relationship classification.

(OR)

12. Explain about building blocks of entity relationship diagram.

13. Explain CODD rules.

(OR)

14. Explain first normal forms, Second normal forms, third normal forms.

15. Explain DDL commands with examples.

(OR)

16. Explain join operation and set operation with examples.

17. Explain database triggers.

(OR)

18. Explain control structures PL/SQL.

Course Code	Title of the Course	L	T	P	C
425701P	**Database Management Systems Lab**			2	1
Prerequisites	Basic Computer Knowledge				

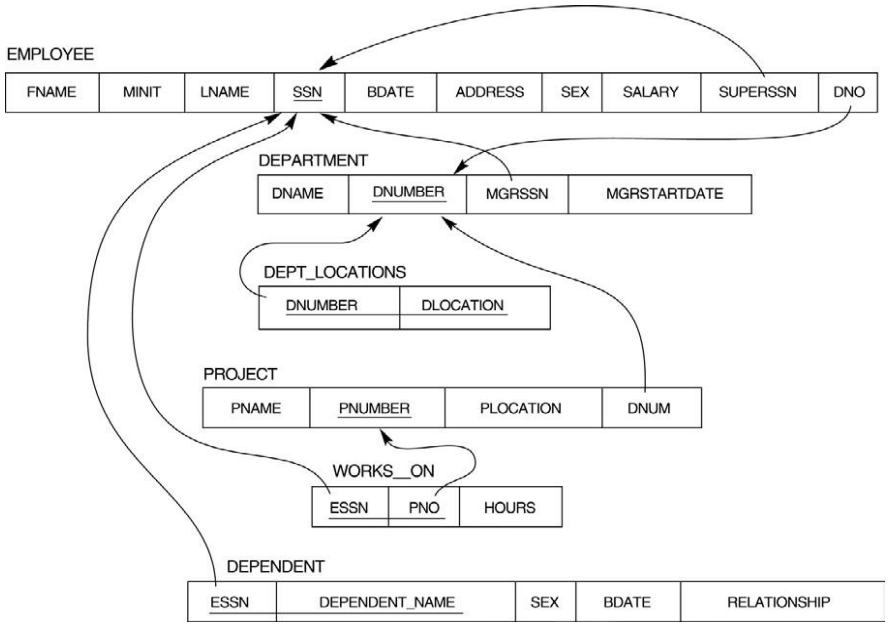
Objectives:

1. Design database using Entity Relationship model, write SQL queries for retrieving data from database.

List of Experiments:

1. Draw ER diagram for hospital administration
2. Creation of college database and establish relationships between tables
3. Relational database schema of a company is given in the following figure.

Relational Database Schema - COMPANY



Questions to be performed on above schema

1. Create above tables with relevant Primary Key, Foreign Key and other constraints
2. Populate the tables with data
3. Display all the details of all employees working in the company.
4. Display ssn, lname, fname, address of employees who work in department no 7.
5. Retrieve the Birthdate and Address of the employee whose name is 'Franklin T. Wong'
6. Retrieve the name and salary of every employee

7. Retrieve all distinct salary values
8. Retrieve all employee names whose address is in ‘Bellaire’
9. Retrieve all employees who were born during the 1950s
10. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)
11. Retrieve the names of all employees who do not have supervisors
12. Retrieve SSN and department name for all employees
13. Retrieve the name and address of all employees who work for the 'Research' department
14. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
15. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
16. Retrieve all combinations of Employee Name and Department Name
17. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan’ either as a worker or as a manager of the department that controls the project.
18. Increase the salary of all employees working on the 'Product X' project by 15%. Retrieve employee name and increased salary of these employees.
19. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
20. Select the names of employees whose salary does not match with salary of any employee in department 10.
21. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
22. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
23. Find the sum of the salaries and number of employees of all employees of the ‘Marketing’ department, as well as the maximum salary, the minimum salary, and the average salary in this department.
24. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
25. Delete all dependents of employee whose ssn is ‘123456789’.

26. Perform a query using alter command to drop/add field and a constraint in Employee table.

Reference Books:

1. Fundamentals of Database Systems by R. Elmasri and S. Navathe

Virtual Lab Links:

1. **http://vlabs.iitkgp.ernet.in/se/4/theory/**

Course Code	Title of the Course	L	T	P	C

425702	**Object Oriented Software Engineering**	3			3
Prerequisites	Basic Programming Knowledge				

Course Objective:

1. 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:

On Completion of the course, the students will be able to-	
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.
CO2	Analyze and specify software requirements, develop use cases and scenarios, apply object-oriented analysis and design (OOAD) principles
CO3	Familiar with the concept of test-driven development (TDD) and its practical implementation
CO4	Analyze and Evaluate Software Maintenance and Evolution Strategies
CO5	Apply Advanced Object-Oriented Software Engineering Concepts

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development			Employability			Entrepreneurship	

Syllabus:

UNIT –I

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

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

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

UNIT –II

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

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 –III

Software Construction and Testing: Software construction basics, Object-oriented design principles, Object-oriented programming languages (Java, C++, Python), Software testing basics (unit testing, integration testing, system testing), Test-driven development (TDD)

Activity: Poster Presentation: Illustrate TDD principles and benefits

Evaluation Method: Poster presentation evaluation questions and engage the audience.

UNIT –IV

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

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Activity: Peer Activity: Analyze and discuss different maintenance strategies

Evaluation Method: Peer discussion participation evaluation

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), Agile software development and Scrum methodologies.

Activity: Seminar on Design Patterns

Evaluation Method: Depth of research, clarity of explanations, ability to address

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

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105153/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. Semester-IV

Object Oriented Software Engineering

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain about class and object with examples.
2. Write a short note on generalization and specialization.
3. Explain about sequence diagram with example.
4. Write a short note on state diagram.
5. Write a short note on unit testing.
6. Write a short note on Integration testing.
7. Write a short note on software version control.
8. Write a short note on Agile software development.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Object-Oriented Programming (OOP) concepts in detail.

(OR)

10. Explain various steps involved in software development life cycle with examples.

11. Explain about requirement analysis and specification.

(OR)

12. Explain about design patterns.

13. Explain about test driven development.

(OR)

14. Explain about various software testing techniques in detail.

15. Software evolution and reengineering

(OR)

16. Explain about code review and inspection.

17. Explain about concept based software engineering.

(OR)

18. Explain about aspect oriented programming.

Course Code	Title of the Course	L	T	P	C
425702P	**Object Oriented Software Engineering Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. Develop SRS document, System design using UML.

List of Experiments:

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

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:

1. 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.

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

Virtual Lab Links:

1. http://vlabs.iitkgp.ac.in/se/

Course Code	Title of the Course	L	T	P	C
425703	**Data Communication and Computer Networks**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives

1. 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:

On Completion of the course, the students will be able to-	
CO1	Understand and apply network applications, hardware, software, and reference models for network communication.
CO2	Design and analyze data link layer protocols, multiple access protocols, and wireless LAN technologies.
CO3	Design routing algorithms, congestion control algorithms, and evaluate network layer protocols for internetworking.
CO4	Analyze transport service, transport protocols, and evaluate UDP and TCP in the internet.
CO5	Understand and evaluate application layer protocols, including DNS, email, WWW, and network management protocols.

Syllabus:

UNIT –I

INTRODUCTION: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, frame relay.

THE PHYSICAL LAYER: Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system.

Activity: Hands-on exercises to configure network applications

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

UNIT –II

THE DATA LINK LAYER: Design issues, error detection and correction, elementary data link protocols, sliding window protocols, example data link protocols - HDLC, the data link layer on the internet.

THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth.

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

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UNIT –III

THE NETWORK LAYER: Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service.

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

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UNIT –IV

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

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

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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, Simple Mail Transfer Protocol, Telnet.

Activity: Group Projects on Network Application Development

Evaluation Method: Group Project Presentations

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.

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105183/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. Semester-IV

Data Communication and Computer Networks

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on network hardware and software.
2. Write a short note on frame relay.
3. Write about error detection using parity bit.
4. Write a short note on wireless LAN.
5. Write a short note on network layer design issues.
6. Write a short note on adaptive routing algorithm.
7. Write a short note on elements of transport protocol.
8. Explain Domain Name System.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about OSI reference model.

(OR)

10. Explain about Guided media and unguided media for transmission.

11. Explain about sliding window protocol.

(OR)

12. Explain HDLC protocol.

13. Explain IPv4 protocol.

(OR)

14. Explain congestion control algorithms.

15. Explain TCP protocol.

(OR)

16. Explain UDP protocol.

17. Explain Simple mail transfer protocol.

(OR)

18. Explain File Transfer protocol.

Course Code	Title of the Course	L	T	P	C
425703P	**Data Communication and Computer Networks Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. To provide students with a comprehensive understanding of networking protocols using Packet Tracer.

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

Reference Books:

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

Virtual Lab Links:

1. http://vlabs.iitkgp.ac.in/ant/

SEMESTER-V

Course Code	Title of the Course	L	T	P	C
525701	**Web Interface Designing Technologies**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives:

1. 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 Word Press and plugins

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand and appreciate the web architecture and services along with its basic building blocks
CO2	Gain knowledge about various components of a website related to aesthetics
CO3	Demonstrate skills regarding creation of a static website and addition of dynamic behavior to a website
CO4	Get experience on making user-interactive web pages.
CO5	Learn how to install word press and gain the knowledge of installing various plugins to use in their websites.

Syllabus:

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

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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: ssess the accuracy, visual design, clarity, creativity, use of visual elements, presentation of the infographic explaining the necessity of

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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.

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

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UNIT –III

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

Activity: Code snippets Challenge.

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

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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, embedding basic animative features using different keyboard and mouse events.

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

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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.

Activity: Creation of Personal website using wordpress

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

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.

Web Links:

1. https://nptel.ac.in/courses/106106222

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

II B.Sc. Semester-IV

Web Interface Designing Technologies

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain about HTML structure.
2. Write the differences between desktop applications and web applications.
3. Explain about CSS colors.
4. Explain about margins and padding.
5. Explain about regular expressions in Java Script.
6. Explain how to access status bar using Java Script.
7. Write features of Java script.
8. Explain Domain Name System.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about OSI reference model.

(OR)

10. Explain about Guided media and unguided media for transmission.

11. Explain about sliding window protocol.

(OR)

12. Explain HDLC protocol.

13. Explain IPv4 protocol.

(OR)

14. Explain congestion control algorithms.

15. Explain TCP protocol.

(OR)

16. Explain UDP protocol.

17. Explain Simple mail transfer protocol.

(OR)

18. Explain File Transfer protocol.

Course Code	Title of the Course	L	T	P	C
525701P	**Web Interface Designing Technologies Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. Develop aesthetic websites, create static and dynamic web pages, implement user interactivity, and gain proficiency in installing and utilizing Word Press and plugins

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:
   (b) 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:

   (c) 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:

1. Installation and configuration of word press
2. Access admin panel and manage posts
3. Access admin panel and manage pages
4. Add widgets and menus
5. Create users and assign roles
6. Create a site and add a theme to it

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

Virtual Lab Links:

1. **https://html-iitd.vlabs.ac.in/**

Course Code	Title of the Course	L	T	P	C
525702	**Web Applications Development using PHP & MYSQL**	3			3
Prerequisites	HTML				

Course Objectives:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Write simple programs in PHP.
CO2	Understand how to use regular expressions, handle exceptions, and validate data using PHP.
CO3	Apply In-Built functions and Create User defined functions in PHP programming.
CO4	Write PHP scripts to handle HTML forms.
CO5	Know how to use PHP with a MySQL database and can write database driven web pages.

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

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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 –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.

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

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

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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.**

Activity: Code snippets Challenge.

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

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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, passing session IDs in the Query String, Destroying Sessions and Unsetting Variables, Using Sessions in an Environment with Registered Users.

Activity: Group discussion on Session Management in PHP

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

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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.

Activity: Hands-on Lab Session on MYSQL Queries

Evaluation Method: Lab Performance and Correctness of solution Implementation

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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).

Web Links:

1. https://onlinecourses.swayam2.ac.in/aic20_sp32/preview

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

III B.Sc. Semester-V

Web Applications Development using PHP & MYSQL

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain about operators in PHP.
2. Explain data types in PHP.
3. Write a short note on arrays.
4. Write a short note on objects in PHP.
5. Write a short note on hidden fields.
6. Explain how to redirect a page in PHP
7. Explain why do we need cookies.
8. Write a short note on MySQL Versus MySQLi functions.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain loops in PHP.

(OR)

10. Explain about functions in PHP with example program.

11. Explain string manipulation functions in PHP.

(OR)

12. Explain date and time functions in PHP.

13. Explain exception handling in PHP.

(OR)

14. Explain how to access form input using defined arrays.

15. Explain how to set cookies, modify cookies, destroying cookies in PHP.

(OR)

16. Explain starting a Session, working with session variables, passing session IDs in the Query String with example program.

17. Explain creating database tables and menu.

(OR)

18. Explain record creation and deletion mechanism in PHP.

Course Code	Title of the Course	L	T	P	C
525702P	**Web Applications Development using PHP & MYSQL Lab**			2	1
Prerequisites	HTML				

Objectives:

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

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.

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).

Virtual Lab Links:

1. https://html-iitd.vlabs.ac.in/basics-of-html/exp/introduction-to-html/references.html

Course Code	Title of the Course	L	T	P	C
525703	**Internet of Things**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand various concepts, terminologies and applications of IoT
CO2	Learn how to build IoT devices with development boards
CO3	Understand various Wireless protocols for IoT
CO4	Learn how to use various sensors and actuators & develop IoT solutions using Arduino
CO5	Develop and Connect IoT with Cloud Platforms.

Syllabus:

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.

Activity: Seminar on various applications of IoT through PPT

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

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.

Activity: Hands-on Lab activity on Arduino Development

Evaluation Method: Lab Performance and Correctness of Circuit Implementation

UNIT –III

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 702.15.4, 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.

Activity: Group discussion on Future Wireless Technologies.

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

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.

Activity: Peer activity on different types of Sensors

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

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.

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

Evaluation Method: Active Participation, Post Talk report presentation

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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

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105246/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

III B.Sc. Semester-V

Internet of Things

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on characteristics of IoT.
2. Explain about history of IoT.
3. Write a short note on actuators and its types.
4. Write a short note on Wireless sensor networks.
5. Write a short note on bacnet and modbus.
6. Write a short note on IEEE 702.15.4 protocol.
7. Write a short note on Aurduino libraries.
8. Write a short note on thingspeak.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain Physical design and logical design of IoT.

(OR)

10. Explain architecture of IoT.

11. Explain about sensor and it's types.

(OR)

12. Explain Arduino board and it's types.

13. Explain Zigbee and Z-Wave protocol.

(OR)

14. Explain how HART and BLE proto.

15. Explain about Arduino UNO architecture.

(OR)

16. Explain about digital and analog sensors with Arduino.

17. Explain Privacy and Security Issues in IoT.

(OR)

18. Explain about AWS IoT, Google Cloud IoT.

Course Code	Title of the Course	L	T	P	C
525703P	**Internet of Things Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. Create IoT solutions to real world problems using IoT.

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 Potentiometer)
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.

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

Virtual Lab Links:

1. **https://iotvirtuallab.github.io/vlab/**

Course Code	Title of the Course	L	T	P	C
525704	**IoT Applications Development and Programming**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the Basic Concepts of Internet of Things
CO2	Learn various Sensors and their associative protocols
CO3	Learn the Single Board Computers for development of IoT
CO4	Build the IoT devices with the Node-RED without Complex coding
CO5	Develop various IoT real-time applications

Syllabus:

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.

Activity: Case Study Presentation on Smart City IoT realization

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

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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**

Activity: Poster Presentation for various kinds of Sensors

Evaluation Method: Creative & informative posters or infographics on Sensors

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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

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Activity: Hands-on Lab using RPi.

Evaluation Method: Lab Performance and Correctness of solution Implementation

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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.

Activity: Hands-on Lab Activity on Node-RED

Evaluation Method: Lab Performance and Correctness of solution Implementation.

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

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

Evaluation Method: Active Participation, Post Talk report presentation

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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 theRaspberry 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

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105246/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

III B.Sc. Semester-V

IoT Applications Development and Programming

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on automobile sensors, smart home sensors.
2. Write a short note on sensor fusion.
3. Write a short note on vision and imaging sensors.
4. Write a short note on temperature sensors.
5. Write a short note on Linux and its use.
6. Write a short note on RaspberryPI and its configuration.
7. Explain about installation of Node Red.
8. Write a short note on Firebase Cloud Connectivity.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about energy based and Electric sensors.

(OR)

10. Explain connectivity protocols.

11. Explain Gas and chemical sensors.

(OR)

12. Explain about sensor communication protocols.

13. Explain functionality of Raspberry pi B+ board.

(OR)

14. Explain Raspberry Pi GPIO Access, Interfacing DHT.

15. Explain NodeRed architecture.

(OR)

16. Explain Matplotlib and its feature or creating various graphs.

17. Explain about Low power wide area networks.

(OR)

18. Explain about fire based cloud connectivity with Arduino board.

Course Code	Title of the Course	L	T	P	C
525704P	**IoT Applications Development and Programming Lab**			2	1
Prerequisites	C Programming				

Objectives:

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

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

Reference Books:

1. Internet of Things Programming Projects: Build modern IoT solutions with theRaspberry 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

Course Code	Title of the Course	L	T	P	C
525705	**Foundations of Data Science**	3			3
Prerequisites	Data Base Management System				

Course Objectives:

1. To enable students to understand Data collection strategies, Descriptive statistics using Python.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Identify the need for data science and understand various data collection strategies
CO2	Understand about NoSQL and Descriptive Statistics
CO3	Apply Numpy methods to process the data in an array.
CO4	Summarize and Compute Descriptive Statistics using Pandas.
CO5	Apply powerful data manipulations visualization using Pandas

Syllabus:

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, Data Munging, Filtering

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Activity: Seminar on Role of Data Science in Politics

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

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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.

Activity: Exercises on Descriptive Statistics

Evaluation Method: Problem Solving, Accuracy

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.

Activity: Hands-on Lab using Numpy

Evaluation Method: Lab Performance and Correctness of solution Implementation

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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.

Activity: Hands-on Lab Activity on Pandas

Evaluation Method: Lab Performance and Correctness of solution Implementation.

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.

Activity: Group Activity to visualize college performance records using various plots

Evaluation Method: Active Participation, Post Talk report presentation

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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,and IPython", 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.

Web Links:

1. https://archive.nptel.ac.in/courses/106/106/106106212/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

III B.Sc. Semester-V

Foundations of Data Science

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on applications of data science.
2. Write a short note on evolution of data science.
3. Explain mean and standard deviation with example.
4. Explain about Skewness and Kurtosis.
5. Explain about Basic Indexing and Slicing.
6. Write a short note on python libraries.
7. Write a short note on Reading and Writing Data in Text Format.
8. Write a short note on handling missing data.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain Data Cleaning, Data Integration and Transformation techniques with example.

(OR)

10. Explain Data Reduction, Data Discretization techniques.

11. Explain Box Plots, Pivot Table, Heat Map.

(OR)

12. Explain Wide-column Databases and Graphical Databases.

13. Explain various Mathematical and Statistic methods for data science.

(OR)

14. Explain Arrays and Vectorized Computation.

15. Explain data frame and its functionalities.

(OR)

16. Explain summarizing and descriptive statistics.

17. Explain data transformation techniques.

(OR)

18. Explain Line Plots, Bar Plots, Histograms and Density Plots.

Course Code	Title of the Course	L	T	P	C
525705P	**Foundations of Data Science Lab**			2	1
Prerequisites	C programming				

Objectives:

1. To enable students to understand Data collection strategies, Descriptive statistics using Python.

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.

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.

Course Code	Title of the Course	L	T	P	C
525706	**Application Development using Python**	3			3
Prerequisites	Java Programming Language				

Course Objectives:

1. Learn the syntax and semantics of Python programming language.
2. Illustrate the process of structuring the data using lists, tuples and dictionaries.
3. Demonstrate the use of built-in functions to navigate the file system.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
CO2	Demonstrate proficiency in handling Strings and File Systems.
CO3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4	Interpret the concepts of Web Programming and GUI in Python
CO5	Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.

Syllabus:

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

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Activity: Hands-on Lab exercise on Python Control Statements

Evaluation Method: Lab Performance and Correctness of solution Implementation

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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

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Activity: Assignment of Files in Python

Evaluation Method: Problem Solving, Accuracy

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

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Activity: Exercises on Regular expressions

Evaluation Method: Solutions, Accuracy of Validation

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

Activity: Poster Presentation on various GUI components in Python

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

UNIT –V

Database Programming: Introduction, Python Database Application Programmer's Interface (DBAPI), Object Relational Managers (ORMs), Related Modules

Activity: Group Project

Evaluation Method: Project effectiveness, User interface, Solution to the Problem

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.

Web Links:

1. https://nptel.ac.in/courses/106106145

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

III B.Sc. Semester-V

Application Development using Python

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on built in objects.
2. Write a short note on unsupported types in python.
3. Write a short note on File built in functions.
4. Explain command line arguments.
5. Rite a short note on Global Interpreter Lock.
6. Write a short note on thread module.
7. Write a short note on Tkinter and Python Programming.
8. Write a short note on how to connect database using python.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain Strings, Lists, and Tuples.

(OR)

10. Explain Dictionaries and Set Types.

11. Explain Exception handling in python.

(OR)

12. Explain modules in Python.

13. Explain Regular expressions in python.

(OR)

14. Explain about multithreading in python.

15. Explain about web surfing with python.

(OR)

16. Explain about python modules related to GUI.

17. Explain about Python Database Application Programmer's Interface (DBAPI).

(OR)

18. Explain about Object Relational Managers (ORMs).

Course Code	Title of the Course	L	T	P	C
525706P	**Application Development using Python Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. Learn the syntax and semantics of Python programming language.
2. Illustrate the process of structuring the data using lists, tuples and dictionaries.
3. Demonstrate the use of built-in functions to navigate the file system.

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 >=70
   Grade B: Percentage>=70 and 70
   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.

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.

Virtual Lab Links:

1. https://python-iitk.vlabs.ac.in/

SEMESTER-VII

Course Code	Title of the Course	L	T	P	C
725701	**Advanced Data Structures**	3			3
Prerequisites	Data Structures				

Course Objective:

1. To familiarize with the organization of data so as to optimize the searching time

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Apply appropriate hashing techniques for a given problem.
CO2	Simulate the operations of Heap trees.
CO3	Provide solutions using multi-way search trees.
CO4	Choose appropriate algorithm while establishing a network.
CO5	Apply the knowledge of disjoint sets for solving a given problem.

Syllabus:

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.

Activity: Quiz on hashing techniques, covering concepts, algorithms, and applications.

Evaluation Method: Assess students' understanding of hashing techniques through quiz scores and performance.

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.

Activity: Seminar on Heap Trees

Evaluation Method: Evaluate the clarity, depth of understanding, and presentation skills demonstrated in the seminar.

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.

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

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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. tree implementation.

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 –V

Disjoint Sets – Equivalence relation, Basic Data Structure, Simple Union and Find algorithms, Smart Union and Path compression algorithm.

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.

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.

Web Links:

1. https://nptel.ac.in/courses/106102064

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

Advanced Data Structures

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain about double hashing.
2. Explain about quadratic probing.
3. Write a short note on Binary heap properties.
4. Explain about Binomial Queue Structure.
5. Explain about B^+ tree properties.
6. Write a short note on 2-3 Tree.
7. Explain about Topological sorting.
8. Write a short note on Disjoint sets with example.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about universal hashing and Extendible Hashing with examples.

(OR)

10. Explain about separate chaining and linear probing techniques with example.

11. Explain about operations of Heap with example.

(OR)

12. Explain about Binomial Queue operations.

13. Explain AVL tree and it's rotations.

(OR)

14. Explain about Red-black trees and it's operations.

15. Explain about Dijkstra's algorithm with example.

(OR)

16. Explain about Floyd-Warshall's Algorithm with example.

17. Explain Simple Union and Find algorithm with example.

(OR)

18. Explain Smart Union and Path compression algorithm with example.

Course Code	Title of the Course	L	T	P	C
725701P	**Advanced Data Structures Lab**			2	1
Prerequisites	Data Structures				

Objectives:

1. To familiarize with the organization of data so as to optimize the searching time using various data structures.

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

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.

Virtual Lab Links:

1. https://ds2-iiith.vlabs.ac.in/List%20of%20experiments.html

Course Code	Title of the Course	L	T	P	C
725702	**Artificial Intelligence**	3			3
Prerequisites	Basic Mathematics				

Course Objective:

1. To provide students with a comprehensive understanding of artificial intelligence (AI) principles and techniques

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Analyze AI problems and search techniques using underlying assumptions and AI techniques.
CO2	Apply heuristic search techniques for problem-solving and optimization.
CO3	Understand knowledge representation approaches and apply predicate logic for representing facts and relationships.
CO4	Utilize rule-based systems for representing knowledge and apply reasoning techniques for problem-solving.
CO5	Implement symbolic reasoning under uncertainty and augment problem-solving strategies with non-monotonic reasoning

Syllabus:

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.

Activity: Group discussion on real-world AI problems and possible search techniques.

Evaluation Method: Active Participation, Presentation and analysis of group discussion outcomes.

UNIT –II

Heuristic Search Techniques: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis

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Activity: Problem-solving tasks using heuristic search algorithms.

Evaluation Method: Assessment of problem-solving approach and solution quality.

UNIT –III

Knowledge 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

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Activity: Hands-on activity to create knowledge representations using predicate logic.

Evaluation Method: Evaluation of knowledge representation accuracy and logical reasoning.

UNIT –IV

Representing Knowledge using Rules: Procedural Vs Declarative knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge

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Activity: Scenario-based problem-solving using rule-based systems.

Evaluation Method: Assessment of problem-solving approach and solution effectiveness.

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.

Activity: Simulation activity to implement symbolic reasoning under uncertainty.

Evaluation Method: Evaluation of simulation results and reasoning accuracy.

Text Books:

1. Russell, S., & Norvig, P. Artificial intelligence: a Modern approach. Third Edition. Pearson new international edition. 2014.

Reference Books:

1. Artificial Intelligence, Second Edition, Elaine Rich, Kevin Knight, Tata McGraw-Hill Edition.

Web Links:

1. https://archive.nptel.ac.in/courses/106/106/106106126/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

Artificial Intelligence

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain issues in the design of search programs.
2. Explain problem problems characteristics.
3. Write a short note on Constraint Satisfaction.
4. Explain about problem reduction.
5. What are the approaches to knowledge representation problem.
6. Explain about representation and mapping.
7. Write a short note on Procedural Vs Declarative knowledge.
8. Write a short note on Non-monotonic Reasoning.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about state space search with example program.

(OR)

10. Explain about AI problems.

11. Explain about Best First Search algorithm with example.

(OR)

12. Explain about Hill climbing algorithm with example.

13. Explain Frame problem.

(OR)

14. Explain about predicate-logic.

15. Explain about Logic Programming.

(OR)

16. Explain about control knowledge.

17. Explain Probability and Bayes Theorem.

(OR)

18. Explain BFS and DFS algorithm.

Course Code	Title of the Course	L	T	P	C
725702P	**Artificial Intelligence Lab**			2	1
Prerequisites	Programming Language				

Objectives:

1. To provide students with a comprehensive understanding of artificial intelligence (AI) principles and techniques

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

Reference Books:

1. Artificial Intelligence, Second Edition, Elaine Rich, Kevin Knight, Tata McGraw-Hill Edition.

Course Code	Title of the Course	L	T	P	C
725703	**Computer Graphics**	3			3
Prerequisites	Basic Mathematics				

Course Objective:

1. To develop a comprehensive understanding of computer graphics principles, techniques, and algorithms, and apply them to create visually appealing 2D and 3D graphics.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand computer graphics fundamentals
CO2	Perform 2D and 3D
CO3	Apply window-to-view port transformation and perform line and polygon clipping operations.
CO4	Determine visible surfaces and apply computer graphics algorithms for depth comparison, back-face removal, and rendering.
CO5	Apply animation principles, work with Flash interface, and gain an introduction to virtual reality

Syllabus:

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

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Activity: Quiz on computer graphics concepts and terminology.

Evaluation Method: Knowledge of computer graphics principles and concepts

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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.

Activity: Hands-on lab sessions on 2D and 3D graphics programming.

Evaluation Method: Practical assignments evaluating the implementation of 2D and 3D graphics operations

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UNIT –III

Clipping: Window to view port transformation, Clipping, line clipping, Cohen —Sutherland line clipping, Polygon clipping, Sutherland and Gary Hodgman polygon clipping algorithm

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Activity: Group Project on window-to-view port transformation and clipping algorithms

Evaluation Method: Project effectiveness, Functionality, Solution to the Problem

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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)

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 –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.

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

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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

Web Links:

1. https://archive.nptel.ac.in/courses/106/106/106106090/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

Computer Graphics

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on advantages of computer graphics.
2. Explain about video controllers.
3. Explain about Homogeneous Coordinates.
4. Explain about 2-Dimensional transformation
5. Explain about window to view port transformation.
6. Explain about clipping.
7. Explain about Image space and object space techniques.
8. Write a short note on Types of Animation.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain Scan Conversion Algorithm.

(OR)

10. Explain display technologies.

11. Explain about 2-D Translation, Rotation, Scaling techniques.

(OR)

12. Explain about 3-D Translation, Rotation Scaling, Reflection, Shear with example.

13. Explain Sutherland and Gary Hodgman polygon clipping algorithm.

(OR)

14. Explain Sutherland line clipping.

15. Explain about Depth comparison Z-Buffer Algorithm.

(OR)

16. Explain Back-Face Removal algorithm.

17. Explain in detail about panel and panel layout algorithm.

(OR)

18. Explain about shaping objects.

Course Code	Title of the Course	L	T	P	C
725703P	**Computer Graphics-Lab**			2	1
Prerequisites	C Programming				

Objectives:

1. To develop a comprehensive understanding of computer graphics principles, techniques, and algorithms, and apply them to create visually appealing 2D and 3D graphics.

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

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

Virtual Lab Links:

1. https://ptp28.github.io/cg-vlab/labs/exp7/index.html

Course Code	Title of the Course	L	T	P	C
725704	**Design and Analysis of Algorithms**	3			3
Prerequisites	Data Structures				

Course Objectives:

1. To design, develop and analyze algorithms to provide optimal solutions.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the fundamental concepts of algorithm analysis and design techniques.
CO2	Apply divide and conquer design techniques for solving problems
CO3	Analyze the performance of given problem using greedy approach.
CO4	Analyze the given problem and provide the feasible solution using dynamic programming.
CO5	Analyze the complexity of a given problem.

Syllabus:

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.

Activity: Algorithm Design Contest.

Evaluation Method: Written exam, assessing understanding and application of Algorithmic Concepts

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UNIT –II

Divide and Conquer: Introduction, Merge sort, Quick sort, Binary Search, Finding Maximum and Minimum, Strassen's Matrix Multiplication

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Activity: Seminar on Divide and Conquer Problem & Solutions.

Evaluation Method: Presentation, Concept Depth, Suitable Applications in real world Domain

---

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.

Activity: Greedy Algorithm Simulation

Evaluation Method: Simulation exercise, evaluating problem analysis and greedy approach

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UNIT –IV

Dynamic Programming: Introduction, 0/1 Knapsack problem, All pairs shortest paths, Optimal Binary search trees, Travelling salesman problem.

Activity: Algorithm Visualization

Evaluation Method: Visual representation of algorithms, understanding, presentation and Communication skills

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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.

Activity: Quiz on complexity analysis concepts

Evaluation Method: Understanding the Complexity classes and problem Analysis

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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.

Web Links:

1. https://nptel.ac.in/courses/106106131

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

Design and Analysis of Algorithms

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on basic efficiency of classes.
2. Explain amortized analysis.
3. Explain about divide and conquer technique with example.
4. Explain Binary search algorithm.
5. Explain about minimum cost spanning tree.
6. Explain Huffman tree.
7. Explain about dynamic programming.
8. Explain Hamiltonian cycle with example.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain Asymptotic notations.

(OR)

10. Explain brute force technique and exhaustive search.

11. Explain quick sort algorithm with example.

(OR)

12. Explain Merge sort algorithm with example.

13. Explain Job sequencing with deadlines.

(OR)

14. Explain Minimum Coin Change problem.

15. Explain travelling salesman problem with example.

(OR)

16. Explain Optimal Binary search trees with example.

17. Explain n-Queens problem.

(OR)

18. Explain complexity classes.

Course Code	Title of the Course	L	T	P	C
725704P	**Design and Analysis of Algorithms using Java / Python Lab**	3			3
Prerequisites	Java/ Python				

Objectives:

1. Implement algorithms to provide optimal solutions using Java/Python Lab.

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.

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.

Virtual Lab Links:

1. http://ebootathon.com/labs/beta/csit/DAA/exp3/simulation.html

Course Code	Title of the Course	L	T	P	C
725705	**Principles of Machine Learning**	3			3
Prerequisites	Data Base Management Systems				

Course Objectives:

1. Understands various supervised and unsupervised machine learning techniques to analyses the data for business applications.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the features of machine learning to apply on real world problems.
CO2	Characterize the machine learning algorithms as supervised learning and unsupervised learning, apply and analyze the various algorithms of supervised and unsupervised learning.
CO3	Analyze the concept of neural networks for learning linear and non-linear activation functions.
CO4	Identify an appropriate clustering technique to solve real world problems.
CO5	Choose a suitable machine learning model, implement and examine the performance of the chosen model for a given real world problems.

Syllabus:

UNIT –I

Introduction: What is Machine Learning, Examples of Various Learning Paradigms, Perspectives and Issues, Version Spaces, Finite and Infinite Hypothesis Spaces, PAC Learning

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Activity: Case Study of real-world applications of Machine Learning

Evaluation Method: Presentation, Concept Depth, Suitable Applications in real world domain

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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, and Logistic Regression.

Activity: Seminar on Supervised Machine Learning Algorithms

Evaluation Method: Presentation, Concept Depth, Suitable Applications in real world domain

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UNIT –III

Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machines: Linear and Non-Linear, Kernel Functions, K-Nearest Neighbors.

Activity: Neural Network Activation Function Exploration

Evaluation Method: Hands-on activity, evaluating the understanding and analysis of linear and non-linear activation functions

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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)

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

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UNIT –V

Machine Learning in Practice Design, Analysis and Evaluation of Machine Learning experiments, Feature selection Mechanisms, other issues: Imbalanced data, missing values, Outliers.

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

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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

Web Links:

1. https://nptel.ac.in/courses/106106139

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

Principles of Machine Learning

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. What is machine learning. Write two examples of machine learning.
2. Write a short note on issues in machine learning.
3. Explain linear class of problem.
4. Explain non-linear class of problem.
5. Explain about K-Nearest Neighbors.
6. Explain perceptron with example.
7. Explain Self-Organizing Map.
8. Explain about outliers with example.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain Finite and Infinite Hypothesis Spaces with example.

(OR)

10. Explain PAC learning.

11. Explain ID3 algorithm with example.

(OR)

12. Explain Linear Regression, Multiple Linear Regression with example.

13. Explain Support Vector Machines.

(OR)

14. Explain Multi-layer perceptron.

15. Explain Gaussian Mixture Models.

(OR)

16. Explain Principal components analysis (PCA) with example.

17. Explain Analysis and Evaluation of Machine Learning experiments.

(OR)

18. Explain Feature selection Mechanisms.

Course Code	Title of the Course	L	T	P	C
725705P	**Principles of Machine Learning Lab using Python / R**	3			3
Prerequisites	Python / R				

Objectives:

1. Implement various supervised and unsupervised machine learning techniques to analyses the data using python/R programming.

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.

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

Virtual Lab Links:

1. https://vlab.spit.ac.in/ai/#/experiments

Course Code	Title of the Course	L	T	P	C
725706	**Software Testing**	3			3
Prerequisites	Software Engineering				

Course Objectives:

1. 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.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand software testing principles and apply effective test case design strategies.
CO2	Implement and execute different levels of testing
CO3	Utilize Selenium for automation testing, including handling web elements and utilizing advanced features.
CO4	Implement and leverage automation testing frameworks for efficient test automation.
CO5	Apply TestNG framework for advanced test execution, management, and parallel processing.

Syllabus:

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

Activity: Group discussion on software testing challenges and strategies

Evaluation Method: Assessment of participation and contribution

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

---

Activity: Assignment on Creation and execution of unit tests

Evaluation Method: Evaluation of accuracy and coverage of unit tests

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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

Activity: Debugging and troubleshooting of test scripts

Evaluation Method: Assessment of problem-solving skills

UNIT –IV

Selenium Framework: Test Automation Framework: Introduction, Benefits of Automation Framework, Types of Automation framework

---

Activity: Case Study on Analysis and optimization of automated test execution for efficiency

Evaluation Method: Assessment of performance improvement and resource usage

---

UNIT –V

Introduction to TestNG: TestNG Framework, TestNG installation, TestNG Annotations and Listeners, TestNG Example, TestNG Process Execution: Batch, Controlled Batch & Parallel

---

Activity: TestNG report generation and analysis

Evaluation Method: Assessment of report accuracy and insights

---

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 NavneeshGarg
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:

1. https://archive.nptel.ac.in/courses/106/105/106105150/
2. https://www.softwaretestingmaterial.com/types-test-automation-frameworks/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

Software Testing

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain manual testing and automation testing.
2. Write a short note on Test adequacy criteria.
3. Write a short note regression testing.
4. Explain unit testing with example.
5. Explain about locator types.
6. Explain how to handle alerts and popups.
7. Explain Benefits of Automation Framework.
8. Explain TestNg annotations and Listeners.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain Test case design strategies with example.

(OR)

10. Explain boundary value analysis.

11. Explain designing Unit testing and integration testing.

(OR)

12. Explain alpha, beta, acceptance testing with example.

13. Explain Selenium and its Components.

(OR)

14. Explain how to create scripts using Firebug and Its Installation.

15. Explain Linear Automation Framework, Modular Based Testing Framework.

(OR)

16. Explain Data-Driven Framework, Keyword-Driven Framework.

17. Explain TestNG Framework and TestNG installation.

(OR)

18. Explain TestNG Process Execution.

Course Code	Title of the Course	L	T	P	C
725706P	**Software Testing Lab using Selenium**	3			3
Prerequisites	Software engineering				

Objectives:

1. 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.

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.

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

Course Code	Title of the Course	L	T	P	C
725707	**Advanced Java Programming**	3			3
Prerequisites	Java Programming				

Course Objectives:

1. To enable students to understand web architecture, create dynamic web pages, Building enterprise applications and Java technologies for mailing and communication.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the multi-tier architecture of J2EE and its implementation in enterprise applications.
CO2	Develop web applications using Java Servlets and establish database connectivity with JDBC.
CO3	Create dynamic and interactive web pages using Java Server Pages (JSP) and implement JSP with beans and custom tag libraries.
CO4	Build enterprise applications using Enterprise Java Beans (EJB) and understand their deployment and configuration.
CO5	Utilize various Java technologies such as JavaMail, CORBA, and Java RMI for effective communication and distributed computing.

Syllabus:

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 –IV

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

Web Links:

1. https://nptel.ac.in/courses/106105191

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

Advanced Java Programming

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on Advantages of Java
2. Explain about Enterprise Application Strategy.
3. Write the differences between Java Servlets and CGI programming.
4. Explain JDBC Drivers.
5. Write a short on JSP versus Servlet.
6. Explain about JSP objects.
7. Explain about EJB classes.
8. Explain how to send Email using Java Mail.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain J2EE Multi-tier architecture.

(OR)

10. Explain about Web-tier, EJB-tier, and EIS-tier.

11. Explain Java servlets life cycle.

(OR)

12. Explain Database connection and data retrieving using JDBC.

13. Explain Java Server Pages with Beans.

(OR)

14. Explain Cookies and session objects with example.

15. Explain Container-managed persistence, Bean-managedpersistence in EJB.

(OR)

16. Explain Security, Query elements in EJB.

17. Explain about Java Remote Method Invocation Concept with example.

(OR)

18. Explain Object Request Brokerage in COBRA.

Course Code	Title of the Course	L	T	P	C
725707P	**Advanced Java Programming Lab**			2	1
Prerequisites	Java Programming				

Objectives:

1. Create dynamic web pages using Servlets, JSP.
2. Use EJB to create bean components
3. Communicate using Java Mail, Java RMI.

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

Reference Books:

1. Subrahmanyam Allaramaju et al.: Professional JSP J2EE 1.3 Edition. Wrox Press
2. K. Qian et al.: Java Web Development Illuminated. Narosa
3. Robert W. Sebesta: Programming the World Wide Web. Pearson

Course Code	Title of the Course	L	T	P	C
725708	**MEAN Stack Development**	3			3
Prerequisites	Web Technology				

Course Objectives

1. 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.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Gain a comprehensive understanding of web development frameworks, JavaScript fundamentals, and DOM manipulation.
CO2	Develop proficiency in creating Node.js applications, handling data I/O operations, and utilizing events and callbacks.
CO3	Build RESTful services using Node.js and Express framework, mastering HTTP handling and routing.
CO4	Acquire knowledge and skills in working with MongoDB, performing CRUD operations, and utilizing Mongoose for database integration.
CO5	Learn to build single-page applications (SPAs) using AngularJS, implementing two-way data binding and MVC architecture.

Syllabus:

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.

Web Links:

1. https://www.mongodb.com/languages/mean-stack-tutorial

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

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

MEAN Stack Development

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on Data types in Java script.
2. Write a short note on operators in Java script.
3. Explain timers in Node.js.
4. Explain listeners in Node.js.
5. Explain how to process URLs.
6. Explain Processing Query Strings in Node.js.
7. Explain Routes, filters in REST.
8. Explain MangoDB data types.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain Events and Document Object Model.

(OR)

10. Explain string manipulation in Java script.

11. Explain Concurrency and event loop fundamentals.

(OR)

12. Explain Compressing and Decompressing Data with Zlib.

13. Explain Building REST services using Node JS REST services.

(OR)

14. Explain Implementing HTTP Clients and Servers in Node.Js

15. Explain CRUD operations with examples.

(OR)

16. Explain MongoDB indexes.

17. Explain Two-way data binding.

(OR)

18. Explain various ways to provide data in Angular JS.

Course Code	Title of the Course	L	T	P	C
725708P	**MEAN Stack Development Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. 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.

List of Experiments:

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.

Reference Books:

1. Ken Williamson, “Learning Angular JS”, O′Reilly; 1 edition
2. Mithun Satheesh, “Web development with MongoDB and Node JS”, Packt Publishing Limited; 2nd Revised edition.

Course Code	Title of the Course	L	T	P	C
725709	**Mobile Application Development**	3			3
Prerequisites	Java Programming				

Course Objectives

1. To provide students with a comprehensive understanding of mobile application development using the Android platform.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Gain a solid understanding of mobile application development principles
CO2	Develop proficiency in setting up the Android development environment
CO3	Acquire the necessary skills to handle and manage Android resources effectively
CO4	Develop expertise in designing user interfaces by utilizing a wide range of UI widgets
CO5	Learn various storage techniques in Android and Understand how to integrate web applications

Syllabus:

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

Activity: Mobile App Development Workshop

Evaluation Method: Students' understanding through a practical project where they develop a basic mobile application.

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

---

Activity: Android Studio Setup and Configuration Session

Evaluation Method: Successful installation and configuration of the Android Studio development environment.

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

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

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

---

Activity: UI Design Competition

Evaluation Method: Creativity, usability, and implementation of UI designs using various UI widgets.

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

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Activity: Web Integration Hackathon

Evaluation Method: Functionality, user experience, and successful data sharing between the two components during the hackathon.

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

Web Links:

1. https://archive.nptel.ac.in/courses/106/106/106106156/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

Mobile Application Development

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write the differences between Mobile applications, Web application development.
2. Write a short note on OHA.
3. Explain Android Manifest File.
4. Explain Android Virtual Devices.
5. Explain about Intent.
6. Explain about Broadcast Receiver.
7. Explain about CheckBox with example.
8. Explain Files & Directories in android.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain Architecture.

(OR)

10. Explain Android Versions with Features.

11. Explain android Activity & Application Life Cycle.

(OR)

12. Explain Android Development Tools.

13. Explain Tween Animation and Frame by Frame Animation.

(OR)

14. Explain Working with Different Types of Resources.

15. Explain about Layouts in Android.

(OR)

16. Explain Views in Android.

17. Explain SQLite Database Connectivity & Operations.

(OR)

18. Explain Building and Publishing Application to Online Application Store.

Course Code	Title of the Course	L	T	P	C
725709P	**Mobile Application Development with Android Lab**	3			3
Prerequisites	Java Programming				

Objectives:

1. To provide students with a comprehensive understanding of mobile application development using the Android platform.

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.

Reference Books:

1. Mark L Murphy, “Beginning Android”, Apress, 2011
2. Prasanna Kumar Dixit, “Android”, Vikas Publishing House Pvt Ltd.

Course Code	Title of the Course	L	T	P	C
725710	**R Programming**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives

1. 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.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Gain a solid understanding of R programming language
CO2	Acquire knowledge and skills in manipulating matrices, lists, and data frames, including performing operations and applying functions.
CO3	Develop the ability to create user-defined functions, handle variable scope, and perform exploratory data analysis, including data preprocessing and descriptive statistics.
CO4	Learn various data visualization techniques in R, including basic and advanced visualizations, as well as creating 3D plots.
CO5	Gain proficiency in inferential statistics and regression analysis using R, including simple linear regression and multiple linear regression.

Syllabus:

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.

Activity: Self Learning through Online resources

Evaluation Method: Online Quiz to access understanding.

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.

Activity: Hands-on Lab Session through Datasets

Evaluation Method: Proficiency in manipulating the Datasets.

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

---

Activity: Data Analysis Competition

Evaluation Method: Students' ability to preprocess data, application of Descriptive Statistics.

UNIT –IV

Data Visualization in R: Types of visualizations - packages for visualizations - Basic Visualizations, **Advanced Visualizations and Creating 3D plots.**

Activity: Infographic Presentation on Data Visualization

Evaluation Method: Clarity, effectiveness, and aesthetics of their created visualizations.

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.

Activity: Project Work

Evaluation Method: Ability to apply the learnt knowledge.

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.

Web Links:

1. https://archive.nptel.ac.in/courses/111/104/111104100/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VII

R Programming

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on R operators.
2. Write a short note on Basic Functions.
3. Explain about adding and removing columns of matrices.
4. Explain about reshaping of matrices.
5. Explain about scope of the variable.
6. Explain about recursion.
7. Explain about 3D plots.
8. Explain about lm() and predict() functions.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about control structures in R.

(OR)

10. Explain about vector operations.

11. Explain about lists and its operations.

(OR)

12. Explain about Data frames and it's operations.

13. Explain data preprocessing.

(OR)

14. Explain about functions in R.

15. Explain about Basic visualization techniques.

(OR)

16. Explain about advanced visualization techniques.

17. Explain about Linear regression and it's implementation in R.

(OR)

18. Explain about Multiple linear regression and its implementation in R.

Course Code	Title of the Course	L	T	P	C
725710P	**R Programming Lab**			2	1
Prerequisites	Basic Programming Knowledge				

Objectives:

1. 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.

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

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.

SEMESTER-VIII

Course Code	Title of the Course	L	T	P	C
825701	**Big Data Technologies**	3			3
Prerequisites	Data Base Management System				

Course Objectives

1. 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.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the importance and challenges of Big Data, including its classification and applications.
CO2	Familiarize with Apache Hadoop and learn data movement and MapReduce algorithms.
CO3	Explore Hadoop architecture, including HDFS, MapReduce tasks, and cluster setup.
CO4	Develop skills in Hive and HiveQL for querying and analyzing data in Hadoop.
CO5	Gain proficiency in HBase, including schema design, advanced indexing, and working with Zookeeper for cluster monitoring.

Syllabus:

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.

Web Links:

1. https://archive.nptel.ac.in/courses/106/104/106104189/

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.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

Big Data Technologies

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain anout 4's in Big data.
2. Write a short note on Applications of Big data.
3. Explain about Matrix-Vector Multiplication by Map Reduce.
4. Explain about Data Serialization.
5. Explain about name node and data node.
6. Explain common Hadoop shell commands.
7. Explain about Sorting and Aggregating.
8. Explain about advanced indexing.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about drivers and challenges of Big data.

(OR)

10. Explain about Big data and types of Big data.

11. Explain about Apache Hadoop and Hadoop eco system.

(OR)

12. Explain about Map reduce algorithm with example.

13. Explain about HDFS Administering – Monitoring & Maintenance.

(OR)

14. Explain about Hadoop architecture.

15. Explain about Hive Architecture.

(OR)

16. Explain about HiveQL and Querying Data in HiveQL.

17. Explain about schema design in HBase.

(OR)

18. Explain about how to Build Applications with Zookeeper.

Course Code	Title of the Course	L	T	P	C
825701P	**Big Data Technologies Lab**			2	1
Prerequisites	Data Base Management Systems				

Objectives:

1. To provide students with a comprehensive understanding including HDFs, Map reduce.

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
12. Write a MapReduce Application to implement Map-side Join
13. Hbase: Setup of Hbase in single node and distributed mode, write program to write some data into hbase and query it

Reference 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.

Course Code	Title of the Course	L	T	P	C
825702	**Compiler Design**	3			3
Prerequisites	Formal Language and Automata Theory				

Course Objectives

1. To provide students with a thorough understanding of various phases of compiler.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the compiler structure and the process of lexical analysis using finite automata.
CO2	Acquire knowledge of syntax analysis techniques, including recursive descent parsing, predictive parsing, and LR parsing.
CO3	Learn about syntax-directed translation, intermediate code generation, and error detection and recovery methods in compilers.
CO4	Explore storage organization, dynamic storage allocation, error recovery methods, and code generation issues in compilers.
CO5	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.

Web Links:

1. https://archive.nptel.ac.in/courses/106/106/106106237/

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 7086 assembly language instructions that can be assembled and run using an 7086 assembler. The target assembly instructions can be simple move, add, sub, jump etc.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

Compiler Design

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Explain about differences between compiler and interpreter.
2. Write short note on applications of language processors.
3. Write a short note on left recursion and it's elimination.
4. Explain about ambiguous grammar.
5. Explain about Variants of Syntax trees.
6. Explain about type declarations.
7. Explain about Access to Nonlocal Data on the Stack.
8. Explain about Issues in the Design of a Code Generator.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about structure of a compiler.

(OR)

10. Explain about elementary scanner design and its implementation (Lex).

11. Explain about LL(1) parser with example.

(OR)

12. Explain about Shift reduce parser with example.

13. Explain about Syntax Directed Translation Schemes.

(OR)

14. Explain about Three Address Code and it's types.

15. Explain about Storage Organization. Stack Allocation of Space.

(OR)

16. Explain about Dynamic Storage allocation techniques.

17. Explain about peep hole optimization.

(OR)

18. Explain about Machine independent optimization with example.

Course Code	Title of the Course	L	T	P	C
825702P	**Compiler Design Lab**			2	1
Prerequisites	Formal Language and Automata Theory				

Objectives:

1. Implement Lexical analyzer, Syntax analyzer using Flex, Lex, YACC tools.

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

Reference Books:

1. TorbengidiusMogensen, Basics of Compiler Design, Springer, 2011.
2. Charles N, Ron K Cytron, Richard J LeBlanc Jr., Crafting a Complier, Pearson Education, 2010.

Virtual Lab Links:

1. https://ankitranvirsingh.github.io/Vlab_compilerdesignlab/

Course Code	Title of the Course	L	T	P	C
825703	**Data Mining Concepts and Techniques**	3			3
Prerequisites	Data Base Management Systems				

Course Objectives

1. To provide students with a thorough understanding of data warehousing and data mining concepts, techniques, and applications.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand data warehousing concepts, including data warehouse architecture, multidimensional data models, and OLAP operations.
CO2	Explore the fundamentals of data mining, including its definition, techniques, and applications in real-world scenarios.
CO3	Develop knowledge and skills in clustering techniques, including partitioning algorithms, hierarchical clustering, and categorical clustering.
CO4	Acquire proficiency in decision tree construction and the use of decision tree algorithms for data analysis and prediction.
CO5	Gain exposure to various advanced data mining techniques, such as neural networks, genetic algorithms, and text mining, including web mining concepts and applications.

Syllabus:

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

Reference Books:

1. Introduction to Data Mining by Tan, Steinbach & Kumar

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105174/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

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.

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

Data Mining Concepts and Techniques

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on OLAP operations.
2. Explain about data reduction techniques.
3. Write a short note on issues in Data Mining.
4. Write a short note on Data Mining applications.
5. Explain about Clustering Paradigms.
6. Explain about , k-Medoid Algorithms.
7. Explain about Pruning Techniques.
8. Explain about Text Clustering.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Data Ware house architecture.

(OR)

10. Explain various data preprocessing techniques.

11. Explain FP-tree algorithm with example.

(OR)

12. Explain apriori algorithm with example.

13. Explain DBSCAN algorithm with example.

(OR)

14. Explain about Hierarchical Clustering with example.

15. Explain about Decision Tree Construction Algorithms.

(OR)

16. Explain about CART, ID3 algorithm.

17. Explain about Genetic algorithms.

(OR)

18. Explain about Web Mining.

Course Code	Title of the Course	L	T	P	C
825703P	**Data Mining Concepts and Techniques Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. Implementing various data mining algorithms using WEKA tools.

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

Reference Books:

1. Data Mining: Concepts and Techniques, 3rd Edition, Jiawei Han, Micheline Kamber, Jian Pei

Virtual Lab Links:

1. https://cse20-iiith.vlabs.ac.in/exp/

Course Code	Title of the Course	L	T	P	C
825704	**Digital Image Processing**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives

1. To provide students with a comprehensive understanding of digital image processing concepts, techniques, and applications.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand digital image processing fundamentals and applications in various domains.
CO2	Develop skills in spatial domain image enhancement techniques
CO3	Acquire proficiency in frequency domain image enhancement
CO4	Master in image segmentation techniques
CO5	Learn image compression principles.

Syllabus:

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.

Web Links:

1. https://archive.nptel.ac.in/courses/117/105/117105135/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
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		24	70	

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

Digital Image Processing

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on OLAP operations.
2. Explain about data reduction techniques.
3. Write a short note on issues in Data Mining.
4. Write a short note on Data Mining applications.
5. Explain about Clustering Paradigms.
6. Explain about , k-Medoid Algorithms.
7. Explain about Pruning Techniques.
8. Explain about Text Clustering.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Components of an Image Processing System.

(OR)

10. Explain Applications of Image Processing.

11. Explain spatial filtering techniques.

(OR)

12. Explain about Arithmetic and logic operations for image enhancement techniques.

13. Explain about Discrete Fourier Transform (DFT).

(OR)

14. Explain about Discrete Cosine Transform (DCT).

15. Explain about Region based segmentation technique.

(OR)

16. Explain about Edge detection techniques.

17. Explain about LZW coding, Transform Coding.

(OR)

18. Explain about DCT implementation using FFT.

Course Code	Title of the Course	L	T	P	C
825704P	**Digital Image Processing Lab**			2	1
Prerequisites	Computer Graphics				

Objectives:

1. To provide students with a comprehensive understanding of digital image processing concepts, techniques, and applications.

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.

Reference Books:

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.

Virtual Lab Links:

1. https://cse19-iiith.vlabs.ac.in/

Course Code	Title of the Course	L	T	P	C
825705	**Information Security and Cryptography**	3			3
Prerequisites	Data, Information concepts, Computer Networks				

Course Objectives

1. To provide students with a comprehensive understanding of cryptography and network security concepts and their practical applications.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Demonstrate the knowledge of cryptography, network security concepts and applications.
CO2	Develop security mechanisms to protect computer systems and networks.
CO3	Apply security principles in system design.
CO4	Apply methods for authentication, access control, intrusion detection and prevention.
CO5	Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

Syllabus:

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

Web Links:

1. https://nptel.ac.in/courses/106105242

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

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
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3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

Information Security and Cryptography

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on CIA Traid.
2. Write a short note on History of Information security.
3. Write a short note on One-time Pad with example.
4. Write a short note on Symmetric and Asymmetric key cryptography.
5. Explain about Principles of public key cryptosystems.
6. Write a short note on Analysis of RSA.
7. Write a short note on Non-malicious Program errors.
8. Explain about Web Security Requirements.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Security Attacks and services.

(OR)

10. Explain The Security Systems Development Life Cycle.

11. Explain DES encryption algorithm.

(OR)

12. Explain AES encryption algorithm.

13. Explain about Elliptic Curve Cryptography.

(OR)

14. Explain SHA-512 algorithm.

15. Explain about IP Security Architecture.

(OR)

16. Explain about Pretty Good Privacy (PGP) and S/MIME.

17. Explain about Secure Electronic Transaction (SET).

(OR)

18. Explain about Fire walls and types of firewalls.

Course Code	Title of the Course	L	T	P	C
825705	**Information Security and Cryptography Lab**	3			3
Prerequisites	Java Programming				

Objectives:

1. Implement various cryptographic algorithms using JAVA.

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)

Reference Books:

1. **Principles of Information Security**, *Whitman*, Thomson.
2. **Cryptography and Network Security** : *Forouzan Mukhopadhyay*, Mc Graw Hill, 2nd Edition

Virtual Lab Links:

https://cse29-iiith.vlabs.ac.in/

Course Code	Title of the Course	L	T	P	C
825706	**Mobile Adhoc and Sensor Networks**	3			3
Prerequisites	Basic Computer Knowledge				

Course Objectives

1. To provide students with a comprehensive understanding of ad hoc wireless networks, including their fundamentals, protocols, and security mechanisms.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the concept of ad-hoc and sensor networks, their applications and typical node and network architectures.
CO2	Describe the MAC protocol issues of ad hoc networks.
CO3	Identify and describe routing protocols for ad hoc wireless networks with respect to TCP design issues.
CO4	Explain the concepts of network architecture and MAC layer protocol for WSN.
CO5	Familiar with the OS used in Wireless Sensor Networks and build basic modules.

Syllabus:

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.

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105240/

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

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CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

Mobile Adhoc and Sensor Networks

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on Radio propagation Mechanisms.
2. Write a short note on Characteristics of the Wireless channel.
3. Write a short note Issues in Designing a MAC protocol for Ad Hoc Wireless Networks.
4. Write a short note on Design goals of a MAC Protocol for Ad Hoc Wireless Networks.
5. Explain about Issues in Designing a Routing Protocol.
6. Write a short note on Classifications of Routing Protocols.
7. Write a short note on Classification of Transport Layer Solutions.
8. Explain about Clustering of Sensors.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Cellular and Ad Hoc Wireless Networks.

(OR)

10. Explain characteristics and applications of MANET.

11. Explain Design goals of a MAC Protocol for Ad Hoc Wireless Networks.

(OR)

12. Explain Contention - Based Protocols with reservation Mechanisms.

13. Explain Destination Sequenced Distance Vector (DSDV) with example.

(OR)

14. Explain Ad Hoc On-Demand Distance Vector Routing (AODV).

15. Explain about TCP Over Ad Hoc Wireless Networks.

(OR)

16. Explain various types of security attacks in MANET.

17. Explain various challenges and applications in WSN.

(OR)

18. Explain various operating systems used in WSN.

Course Code	Title of the Course	L	T	P	C
	Mobile Ad hoc and Sensor Networks Lab			2	1
Prerequisites	Computer Networks				

Objectives:

1. Simulate various routing algorithms, Networking protocols using *NS-2/NS-2/OMNET++/OPNET etc.*

List of Experiments:

All the experiments should be done on any Network Simulator like NS-2/NS-2/OMNET++/OPNET etc.

2. Study various network simulators used for wireless Ad-Hoc and Sensor Networks.
3. Introduction to TCL scripting: demonstration of one small Wireless network simulation script.
4. Study various trace file formats of network simulators.
5. Implement and compare various MAC layer protocols.
6. Generate TCL script for UDP and CBR traffic in WSN nodes.
7. Generate TCL script for TCP and CBR traffic in WSN nodes.
8. Implement and compare AODV and DSR routing algorithms in MANET for various parameters.
9. Implement DSDV routing algorithms in MANET.
10. Calculate and compare average throughput for various TCP variants.
11. Implement and compare various routing protocols for wireless sensor networks.
12. Study Ethereal / Wireshark software and analyze dump files.

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.

Virtual Lab Links:

1. http://vlabs.iitkgp.ac.in/ant/7/exercise/

Course Code	Title of the Course	L	T	P	C
825707	**Advanced Database Management Systems**	3			3
Prerequisites	Data Base Management Systems				

Course Objectives

1. To provide students with a Through theoretical knowledge and practical application of advanced topics in database management systems.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Gain understanding of relational database concepts, functional dependencies, and correctness of FDs.
CO2	Analyze and apply normalization techniques (3NF, BCNF, 4NF, 5NF)
CO3	Develop skills in processing joins, grasp materialized vs. pipelined processing
CO4	Learn principles of correct interleaved execution, locking mechanisms (2PL), handle deadlocks.
CO5	Acquire knowledge of T/O-based techniques, multi-version approaches

Syllabus:

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

1. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, “Database Systems: The Complete Book”, Pearson, 2011.

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105175/

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

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO 1	PO2	PO 3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PSO 1	PSO 2	PSO 3	PSO 4	
CO1															
CO2															
CO3															
CO4															
CO5															

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

Advanced Database Management Systems

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on Data, Information, Data base.
2. What is trivial functional dependency and explain with example.
3. Write a short note external sorting.
4. Write a short note File scan.
5. Explain about Data base transactions.
6. Explain about pipelined processing.
7. Explain about Global and Local transactions in Distributed transactions.
8. Explain about T/O based techniques.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Closure of functional dependencies with example.

(OR)

10. Explain about Correctness of FDs with examples.

11. Explain about 4NF and 5NF with example.

(OR)

12. Explain about 3NF and BCNF with example.

13. Explain about query transformation rules.

(OR)

14. Explain about ACID properties, interleaved executions.

15. Explain about 2PL, deadlocks.

(OR)

16. Explain about Concurrency Control on B+ trees.

17. Explain Failure classification, recovery algorithm.

(OR)

18. Explain about XML and relational databases.

Course Code	Title of the Course	L	T	P	C
825707P	**Advanced Database Management Systems Lab**			2	1
Prerequisites	Data Base Management System Concepts				

Objectives:

1. To provide students with a practical knowledge in advanced topics of database management systems.

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

Reference Books:

1. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, “Database Systems: The Complete Book”, Pearson, 2011.

Course Code	Title of the Course	L	T	P	C
825708	**Cloud Computing**	3			3
Prerequisites	Computer Networks				

Course Objectives

1. To provide students with a comprehensive understanding of cloud computing concepts, virtualization technologies, and different service models in the context of cloud computing.
2. The course will explore the origins, components, and essential characteristics of cloud computing, along with the benefits and limitations associated with its adoption

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the essential characteristics and benefits of cloud computing
CO2	Gain knowledge of virtualization technologies
CO3	Explore Microsoft implementation of virtualization and understand different cloud deployment models and their advantages.
CO4	Learn about Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) models,
CO5	Explore Software as a Service (SaaS) and its service providers.

Syllabus:

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, TM

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 Saleforceweb tutorials

Web Links:

1. https://archive.nptel.ac.in/courses/106/105/106105247/

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

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CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

CLOUD COMPUTING

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on components of cloud computing.
2. Write a short note on characteristics of cloud computing.
3. Write a short note storage virtualization.
4. Write a short note Network virtualization
5. Explain about Microsoft Hyper.
6. Explain about VMware features.
7. Explain about GoGrid.
8. Explain about Google App Engine.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about privacy concern, security level of third party.

(OR)

10. Explain about Location independent resource pooling.

11. Explain about hardware virtualization and its types.

(OR)

12. Explain about software virtual virtualizations.

13. Explain about private clouds, public clouds.

(OR)

14. Explain about community clouds, hybrid clouds.

15. Explain about Oracle APEX cloud - Services and Benefits

(OR)

16. Explain about PaaS service providers.

17. Explain SaaS service providers.

(OR)

18. Explain about google platform benefits.

Course Code	Title of the Course	L	T	P	C
825708P	**Cloud Computing Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. To provide students with a practical knowledge on setting up virtual machines, Virtual cloud, Analyze the services available on Oracle APEX.

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

Reference Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
2. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madisetti, University Press
3. AWS, Azure and Saleforce web tutorials

Course Code	Title of the Course	L	T	P	C
825709	**Computer Vision**	3			3
Prerequisites	Image Processing				

Course Objectives

1. 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.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the fundamental concepts of computer vision and its applications in various domains.
CO2	Apply color and geometric transforms, edge-detection techniques, filtering, and mathematical operations to analyze images.
CO3	Comprehend the concept of motion estimation and its applications.
CO4	Apply shape correspondence, shape matching, principal component analysis, and shape priors for object recognition.
CO5	Explore various applications of computer vision

Syllabus:

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

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

Computer Vision

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on Medical Image analysis.
2. Write a short note on Biometrics
3. Write a short note geometric transform.
4. Write a short note convolution, filtering.
5. Explain about Motion estimation.
6. Explain about Optical computation.
7. Explain about shape matching.
8. Explain about Eigen faces.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Virtual Reality and Augmented Reality.

(OR)

10. Explain Content-Based Image Retrieval.

11. Explain about Edge detection techniques.

(OR)

12. Explain various mathematical operations on images.

13. Explain about Optical computation.

(OR)

14. Explain about Regularization theory.

15. Explain about Principal component analysis.

(OR)

16. Explain about Hough transforms.

17. Explain about In vehicle vision system.

(OR)

18. Explain about Chamfer matching, tracking, and occlusion.

Course Code	Title of the Course	L	T	P	C
825709P	**Computer Vision with OpenCV Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. To equip the students with the practical knowledge on Image processing, Image analysis.

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

Reference Books:

1. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
2. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012

Course Code	Title of the Course	L	T	P	C
825710	**Digital Forensics**	3			3
Prerequisites	Operating System concepts				

Course Objectives

1. 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.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Gain a clear understanding of the fundamentals of digital forensics
CO2	Develop knowledge and skills in analyzing storage media and file systems
CO3	Learn about network forensics and acquire practical skills in network packet sniffing, analysis using tools like Wireshark and TCPDUMP
CO4	Gain expertise in logs and event analysis, data carving
CO5	Develop proficiency in wireless and web attacks.

Syllabus:

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 2024
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

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CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1														
CO2														
CO3														
CO4														
CO5														

Model Blue print for the question paper setter

Blue Print				
S.No.	UNIT-	Short 3 M	Essay 7 M	Weightage
1	I	2	2	20.8%
2	II	2	2	20.8%
3	III	2	2	20.8%
4	IV	1	2	18.75%
5	V	1	2	18.75%
		24	70	

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

IV B.Sc. Semester-VIII

Digital Forensics

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 ½ Hrs. **Max Marks: 50 M**

SECTION - I

Answer any FIVE questions **5 X 3= 15M**

1. Write a short note on Objectives of computer forensics.
2. Write a short note on Roles of forensic investigator.
3. Write a short note Mac OS Boot Sequence.
4. Write a short note Linux booting process.
5. Explain about Overview of EnCase Forensics.
6. Explain about nslookup.
7. Explain about Forensics and Log analysis.
8. Explain about PDF File Analysis.

SECTION - II

Answer the following questions **5 X 7 = 35M**

9. Explain about Digital Evidence Investigation Process.

(OR)

10. Explain about Issues Facing Computer Forensics, Types of Investigation.

11. Explain about File System, Type of File Systems File System.

(OR)

12. Explain about Recovering deleted files and partitions.

13. Explain OSI internet Layers and their Forensic importance

(OR)

14. Explain about Packet Sniffing and Analysis using Ettercap and Wireshark.

15. Explain about Password Cracking using Rainbow Tables.

(OR)

16. Explain Remote Imaging using E3 Digital Forensics.

17. Explain Mobile Device Forensics.

(OR)

18. Explain Vulnerability Analysis.

Course Code	Title of the Course	L	T	P	C
825710P	**Digital Forensics Lab**			2	1
Prerequisites	Basic Computer Knowledge				

Objectives:

1. To equip students with the Practical knowledge on various tools required for digital forensics.

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

Reference Books:

1. *Clint P Garrison,* **"Digital Forensics for Network, Internet, and Cloud Computing A forensic evidence guide for moving targets and data"** , Syngress Publishing, Inc. 2010

CERTIFICATE COURSE

Course Code	Title of the Course	60 hours
	Data Analysis using Excel	
Prerequisites		

Course Objective

1. To help the students to understand the features of Excel and analyses data using Excel.

SYLLABUS

UNIT I

About Excel & Microsoft, Uses of Excel, Excel software, Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar, the Ribbon, File Tab and Backstage View, Formula Bar, Workbook Window, Status Bar, Task Pane, Workbook & sheets.

Selecting Columns & Rows, Changing Column Width & Row Height, Autofitting Columns & Rows, Hiding/Unhiding Columns & Rows, Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell – Format, value, formula, Use of paste and paste special

UNIT II

Excel sharts Charts: Creating Charts, Different types of chart, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table Data Analysis : Sorting, Filter, Text to Column

Data Validation PivotTables: Creating PivotTables, Manipulating a PivotTable, Using the PivotTable Toolbar, Changing Data Field, Properties, Displaying a PivotChart, Setting PivotTable Options, Adding Subtotals to PivotTables.

UNIT III

Excel Tools: Moving between sheets, Selecting Multiple sheets, Inserting and Deleting sheets Renaming sheets, Splitting the Screen, Freezing Panes, Copying and Pasting Data between Spreadsheets, Hiding, Protecting worksheets Making Macros: Recording Macros, Running Macros, Deleting Macros

Text Book(s)

1. Excel Data Analysis For Dummies (For Dummies (Computer/Tech)) 4th Edition By Paul McFedries
2. Microsoft Excel Data Analysis and Business Modeling (Business Skills) 5th Edition by Wayne Winston (Author)

Reference Book(s)

3. Marketing Analytics: Data-Driven Techniques with Microsoft Excel 1st Edition by Wayne L. Winston (Author)

Assessment Scheme

Internal Assessment	50 Marks
External Exam	50 Marks

Internal Exam Scheme

Practical Assessment	30 Marks
Record	10 Marks
Viva-Voce	10 Marks

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Data Analysis using Excel

MODEL QUESTION PAPER (W.E.F 2023-2024)

Time: 2 Hrs. **Max Marks: 50 M**

Answer any FIVE questions: **5 x 10 = 50M**

1. Q1
2. Q2
3. Q3
4. Q4
5. Q5
6. Q6
7. Q7
8. Q8
9. Q9
10. Q10

Proposed Activities in the Department of Computer Science & Applications for the Academic Year 2023 - 24

Proposed Activities in the Department of Computer Science & Applications for the Academic Year 2023 - 24

Day	Date	Activities Planned
International Women's Day	March 8	• Guest speaker sessions featuring accomplished women in computer science • Panel discussions on gender diversity and equality
World Software Freedom Day	September 19	• Workshops on open-source software • Talks on the benefits of software freedom • Open-source project showcase
Global Accessibility Awareness Day	May 20	• Demonstrations of accessible technology • Discussions on designing inclusive user experiences for individuals with disabilities
National Cybersecurity Awareness Month	October	• Cybersecurity workshops and training sessions • Seminars on online safety and protecting digital assets
Ada Lovelace Day	Second Tuesday of October	• Presentation of notable achievements by women in STEM fields • Inspirational talks by female computer science professionals
Computer Science Education Week	December 9 15	• Coding bootcamps and hackathons • Coding competitions • Programming workshops for beginners
Internet Day	October 29	• Presentations on the evolution and impact of the internet • Discussions on internet governance and digital communication

Data Privacy Day	January 28	• Workshops on data privacy best practices • Presentations on the importance of protecting personal data
Safer Internet Day	Second Tuesday of February	• Interactive sessions on online safety and responsible internet use • Tips for securing online accounts and information
World Telecommunication and Information Society Day	May 17	• Talks on the role of ICT in societal development • Discussions on bridging digital divides through technology
AI Day	December 16	• Keynote speeches on AI advancements and challenges • Ethical discussions related to AI and machine learning
Computer Science Education Day	December 9	• Reflection on the impact of computer science education • Alumni sharing their experiences and career journeys
Software Engineers Day	September 26	• Presentations on software engineering innovations • Showcasing student projects related to software development
National STEM/STEAM Day	November 8	• Workshops and activities emphasizing STEM/STEAM fields • Hands on projects demonstrating the intersection of arts and technology
National Technology Day	May 11	• Exhibitions showcasing technological achievements and innovations • Tech talks on emerging technologies

Workshops and Seminars Planned for the Academic Year 2023-24

1. **Ethical Hacking Workshop: (February)**

   Topics: Introduction to ethical hacking, cybersecurity practices

   Budget: ₹25,000 - ₹30,000 (including trainer fees, materials, and certificates)
2. **Data Science Seminar: (December)**

   Topics: Data analysis, machine learning, AI applications

   Budget: ₹20,000 - ₹30,000 (speaker fees and materials)
3. **Blockchain and Cryptocurrency Seminar: (November)**

   Topics: Blockchain technology, cryptocurrency trends

   Budget: ₹20,000 - ₹30,000 (speaker fees, materials, and certificates)
4. **Mobile App Development Workshop: (April/June)**

   Topics: App development, UI/UX design, app deployment

   Budget: ₹40,000 - ₹50,000 (trainer fees, materials, and certificates)

Tentative Topics for Community Survey Project

1. Digital Literacy and Access to Technology in the Local Community
2. Usage and Perception of E-Government Services among Residents
3. Cybersecurity Awareness and Practices in the Community
4. Impact of Social Media on Community Engagement and Communication
5. E-commerce Adoption and Online Shopping Behaviour in the Local Area
6. Awareness of Data Privacy and Protection Among Community Members
7. Smartphone Usage Patterns and App Preferences in the Neighbourhood
8. Community Perspectives on AI and Automation in Everyday Life
9. Online Learning and Education Technology Adoption in the Local Community
10. Health and Fitness App Usage and Its Impact on Lifestyle
11. Sustainability Practices and Awareness within the Community
12. Local Community's Views on Digital Entertainment and Streaming Services
13. Perception and Attitudes towards Online Privacy and Data Collection
14. Community's Knowledge and Perception of Cloud Computing Services
15. Social Impact of Ride-Sharing and Food Delivery Apps in the Neighbourhood
16. Digital Payment Adoption and Usage Trends among Residents
17. Community's Readiness for 5G Technology and Its Potential Benefits
18. Digital Inclusion and Challenges Faced by Vulnerable Community Members
19. Local Businesses' Utilization of E-commerce Platforms and Strategies
20. Community Engagement with Open-Source Software and Contributions