

SRI A.S. N. M GOVERNMENT COLLEGE (A), PALAKOL, W.G. DT
(Affiliated to AdikaviNannaya University, Rajahmundry)

Accredited with NAAC "B+" Grade with 2.67 CGPA (3rd Cycle)

2023-24

DEPARTMENT OF COMPUTER SCIENCE
HONOURS PROGRAMME PRE BOS MEETING FOR COMMON PAPERS
AY - 2023-2024

Date: 1-9-2023

The In charges of the Mathematics, Physics, Computer Science and Chemistry Departments assembled in Department of Chemistry laboratory in the presence of Honorable Principal, Academic Coordinator and Controller of Examinations on 1.9.2023 at 2.00 pm regarding Pre BOS meeting for two common core papers in First semester of 2023-24 academic year entitled

"Essentials of Mathematics, Physics, Chemistry & Computer Science" and "Advances in Mathematical, Physical and Chemical Sciences".

Agenda:

- * Conduction of BOS for common papers in Semester1 (2023-24).
- * Sharing of Syllabus and activities for the common papers.
- * Sharing of workload among the Mathematics, Physics, Computer Science and Chemistry faculty.
- * Marks allocation in CIA for activities provided in the syllabus.
- * Scheme and Evaluation of Papers.

Resolutions:

- It is resolved to conduct the BOS for the two common papers by the concerned departments and get approval.
- It is resolved to share the syllabus and activities of common papers among the concerned Departments as mentioned in chapter division.
- It is resolved to share the workload internally, department wise and mention in the Department minutes book.
- For the paper "Essentials of Mathematics, Physics, Chemistry & Computer Science" 1 component each from those papers will be prepared by Mathematics, Physics, Chemistry Departments along with Dept. of Computer Science and 1 component will be prepared collectively by remaining departments.
- For the paper "Advances in Mathematical, Physical and Chemical Sciences" 1 component each from those papers will be prepared by Mathematics, Physics, Chemistry Departments along with Dept. of Computer Science and 1 component will be prepared collectively by remaining departments.

- "Essentials of Mathematics, Physics, and Chemistry & Computer Science" Paper will be evaluated by Computer Science faculty, with the elaborated scheme including answers provided by the respective departments.
- "Advances In Mathematical, Physical And Chemical Sciences" Paper will be evaluated by Computer Science faculty, with the elaborated scheme including answers provided by the respective departments.
- It is resolved that in CIA 10 marks will be allotted for activities of common papers in the inventory tasks components 2 & 3 provided by CCE SOP dated-6/4/2022.

Chapter division

"Essentials of Mathematics, Physics, Chemistry & Computer Science"

* Unit 1 - Mathematics, Unit II - Physics, Unit III - Chemistry, Unit IV - Each department will take up their part. Unit V - Computer Science departments respectively.

"Advances In Mathematical, Physical And Chemical Sciences"

* Unit 1 - Mathematics, Unit II - Physics, Unit III - Chemistry, Unit IV - Each department will take up their part. Unit V - Computer Science departments respectively.

Activities Marks: 10

1. Field trip and awareness programs on computer Literacy-Computer Science
2. Create awareness and experience about LMS tool like Google Classroom (Conduct online examination).

1. V. L. 1/9/2023

2. K. S. 1/9/23

3. [Signature]

4. [Signature]

K. B. 1/9/23

**SRI A. S. N. M. GOVERNMENT COLLEGE (A), PALAKOL
W.G. DT.**

BOARD OF STUDIES 2023-24



DEPARTMENT OF COMPUTER SCIENCE

Curriculum for the Academic Year 2023-24

Date: 05.09.2023


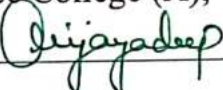


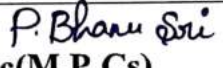
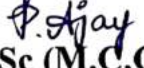
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2023-24

DEPARTMENT OF COMPUTER SCIENCE- BOARD OF STUDIES

Board of Studies Chairman Head of the Department	Sri K.Bhadrachalam 
University Nominee	Dr. M. Pramod Kumar, Lecturer in Computer Applications, SRR & CVR Govt. Degree College (A), Vijayawada, Krishna Dt.
Subject Experts	1. Sri VIJAYADEEP GUMMADI, Lecturer in Computer Science, SRR & CVR Govt. Degree College (A), Vijayawada, Krishna Dt. 
	2. Sri P. ARUN KUMAR, Lecturer in Computer Science, GDC, Kovvur, East Godavari Dt. 
Industrialist / Businessman	Sri K. RajasekharReddy, Director, Manohar Plastic Industries, Penugonda, West Godavari Dt.
Alumni	K. B. Srinath Adocate
Member of the Department	Sri B. Suneel Kumar 
Students	1. P. Bhanu Sri  III B.Sc(M.P.Cs) 2. P. Ajay  II B.Sc (M.C.Cs)

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DEPARTMENT OF COMPUTER SCIENCE- BOARD OF STUDIES

Agenda

1. To prescribe the syllabi suggested by APSCHE and UNIVERSITY, with modifications if any not exceeding 20% to suit the local needs, to be implemented from the academic year 2023-2024.
2. To follow the same evaluation pattern approved in the academic year 2022-2023 batch as a 60:40 ratio (60 marks- External and 40 Marks-Internal).
3. Hands-on Training with Industry tie-up/Internships (for the II & III year students)
4. To select paper setters and examiners for theory and practical wherever applicable from the panel of Readers/Lecturers working in some reputed colleges.
5. To approve blueprint and model question papers for theory and practical wherever applicable for semester examinations.
6. Research, Teaching, Extension and other academic activities in the department suggest Methodologies for innovative methods for Teaching and Learning.
7. To prepare a scheme of valuation for practical's of all semesters.
8. Any other with the permission of the chair.

K. Bhella

1. Vijayadeep
2. Anuram

3.

4. 

5.

6.

7. P. Ajay

8. P. Bharu Sri

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2023-24

DEPARTMENT OF COMPUTER SCIENCE- BOARD OF STUDIES

After thorough discussion the following resolutions were made by the Department BOS

Resolutions:

1. It is resolved to adopt the Revised CBCS syllabus (both theory & practical's) & model papers suggested by APSCHE, with small modifications for I, II Semesters for the academic year 2023-24.
 - a) It is resolved to introduce single major subject system along with minor subject for the academic year 2023-24.
 - b) It is resolved to follow the same syllabus (both theory & practical's) & model papers for III, IV and V semesters which was approved in the last year's BOS meeting.
2. It is resolved to follow the same pattern of evaluation for III year degrees courses and to follow the new pattern of evaluation for the 2023-24 admitted batch which was approved for 2022-23 batch.
 - a) It is resolved to evaluate the student performance under continuous internal assessment (CIA) and semester-end examination components at a 40:60 ratio for the I and II B.Sc Programme. And at a 25:75 ratio for the III B.Sc Programme. The duration of the examination is 3:00 hrs
 - b) It is resolved to approve Continuing Internal Assessment (CIA) for I, II, III and IV semesters as follows.

Direct Method: 35 Marks comprising of I Mid Exam for 20 Marks and II Mid Exam for 15 Marks.

Indirect Method: 15 Marks comprising of
Assignment – 5M, Any one Pedagogy Method - 5M (Classroom Seminar/Quiz/Group Discussion etc)
Clean and Green and attendance - 5M and a total of 50 marks will be scaled down to 40 Marks.
 - c) It is resolved to approve Continues Internal Assessment for V semester is as follows:

Direct Method: 35 Marks comprising of I Mid Exam for 20 Marks and II Mid Exam for 15 Marks.

Indirect Method: 15 Marks comprising of
Assignment – 5M, Any one Pedagogy Method - 5M (Classroom Seminar/Quiz/Group Discussion etc.)
Clean and Green and attendance - 5M and a total of 50 marks will be scaled down to 25 Marks.

3. It is resolved to encourage students to take up CSP and Short term Internship after the completion of II and IV semester of their study.
4. It is resolved to arrange Internships for II and III year students by contacting Industries of nearby towns, mapped to some Industries outside the town provided by CCE and encouraging students to go and learn the work and techniques related to work.
5. It is resolved to sign MOU with nearby industries to provide Internship to students during IV semester and either V or VI Semesters.
6. Resolved that the passing marks for external examination are 24 Marks (40%) and for internal examination is 16 Marks (40%). Candidates should get a total mark of 40, in both internal and external examinations put together.
7. It is resolved to conduct odd semester practical examinations with internal faculty members with subject teacher and another teacher in the department and even semester practical examinations to be conducted involving external examiners.
8. It is resolved to offer Certificate Courses/Add on Courses/Value added Courses for the II year students for the academic year 2023 - 2024.
9. Resolved to adopt all the Modern teaching learning Methods including ICT and Digital boards.
10. Resolved to advise the entire faculty to apply for UGC for financial assistance to conduct Seminars/Workshops/Conferences/MRPs, etc., and to arrange field trips Surveys, Society outreach programmes etc.
11. Resolved to conduct Guest Lectures, Study Projects for the academic year 2023-2024.
12. Resolved to approve the list of question paper setters and examiners appended herewith.
13. It is resolved to approve programme outcomes, programme-specific outcomes, course outcomes and course codes.
14. It is resolved to follow the course structure given by APSCHE with necessary changes to syllabus Wherever needed.
15. It is resolved to add/delete contents for III, IV, and V Semesters which was approved in the last year BOS meeting. With a small additional topic in paper 6A.
16. It is resolved to modify some contents of the syllabus not more than 20 percent. These modifications is only for the benefit of the students. Few topics are deleted, though modifications are done, they will not be effected for any competitive examinations and other.

K. Bhalu

1. Ajayadeep
2. Anurag

3.

4. ~~TSB~~

5.

6.

7. P. Ajay

8. P. Bhanu Sri

DEPARTMENT OF COMPUTER SCIENCE

S.No	Sem & Course Name	Deletions	Additions
1	II Sem Course 3: Problem Solving using C	UNIT-I Basic block diagram UNIT II – Jump Statement	-----
2	II Sem Course 4: Digital Logic Design	-----	Additional Topic: Universal Gates(NAND, NOR)
3	III Sem Course 3: Database Management Systems	Unit I: database approach, three schema architecture of data base, costs and risks of database approach. Unit II: constraints on specialization and generalization.	UNIT –III: Levels of database upto 3 rd normal form. – changed to 1NF, 2NF, 3NF and BCNF
4	III Sem Course 4: Object Oriented Programming using Java	UNIT V- A Simple Game with an Applet, Animation in Applets	draw shapes and face using applet Additional Topic: Basic structure of Collection framework concepts
5	IV Sem Course 5: Operating System	-----	Additional Topics: Disk scheduling techniques


BOS Chairman

Members present:

1. 

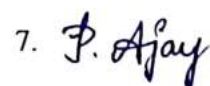
2. 

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7. 

8. 

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DEPARTMENT OF COMPUTER SCIENCE

K. Bhadrachalam, In-charge of Department of Computer Science request the Academic Council to consider and approve the changes in the syllabi recommended by the Board of Studies for the Academic year 2023-2024. The BOS meeting held on 05-09-2023. The academic council is also requested to accord permission to appoint examiners for the academic year 2023-2024.


Chairman

Board of Studies

1. 

2. 

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4. 

5.

6.

7. P. Ajay

8. P. Bharu Sri

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DEPARTMENT OF COMPUTER SCIENCE

(SINGLE MAJOR)

COURSE STRUCTURE - 2023-24

B.SC. (W.E.F 2023-24 Batch)

SEMESTERS – I, II

Year	Semester	Course	Title	Hrs	Credits	Mid Sem Exam	Sem End Exam	Total
I Year	Semester I	Course 1	Essentials and Applications of Mathematical, Physical and Chemical Sciences	5	4	40	60	100
		Course 2	Advances in Mathematical, Physical and Chemical Sciences	5	4	40	60	100
	Semester II	Course 3	Problem Solving using C	3	3	40	60	100
			Problem Solving using C Lab	2	1	-	50	50
		Course 4	Digital Logic Design	3	3	40	60	100
			Digital Logic Design Lab	2	1	-	50	50

K. Bhalla

1. Vijayadeep
2. Arun Kumar
- 3.
4. ~~ISA~~
- 5.
- 6.

7. P. Ajay.

8. P. Bharu Sru

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DEPARTMENT OF COMPUTER SCIENCE

(MPCS & MCCS)

COURSE STRUCTURE - 2023-24

B.SC. (W.E.F 2020-21 Batch)

SEMESTERS – III, IV, V

Year	Semester	Course	Title	Hrs	Credits	Mid Sem Exam	Sem End Exam	Total
II Year	Semester III	Course III	Database Management System	4	4	40	60	100
			Database Management System Lab	2	1	-	50	50
	Semester IV	Course IV	Object Oriented Programming using Java	4	4	40	60	100
			Object Oriented Programming using Java Lab	2	1	-	50	50
		Course V	Operating Systems	4	4	40	60	100
			Operating Systems Lab using C/Java	2	1	-	50	50

YEAR	Course	Title	Teaching Hours	Credits	Mid Sem Exam	Sem End Exam	Total Marks
III YEAR Semester V	Course VI-A	Web Interface Designing Technologies	3	3	25	75	100
		Web Interface Designing Technologies Lab	3	2	-	50	50
	Course VII-A	Web Applications Development using PHP& MYSQL	3	3	25	75	100
		Web Applications Development using PHP& MYSQL Lab	3	2	-	50	50

(OR)

YEAR	Course	Title	Teaching Hours	Credits	Mid Sem Exam	Sem End Exam	Total Marks
III YEAR Semester V	Course VI-B	Internet of Things	3	3	25	75	100
		Internet of Things Lab	3	2	-	50	50
	Course VII-B	Application Development using Python	3	3	25	75	100
		Application Development using Python Lab	3	2	-	50	50

(OR)

YEAR	Course	Title	Teaching Hours	Credits	Mid Sem Exam	Sem End Exam	Total Marks
III YEAR Semester V	Course VI-C	Data science	3	3	25	75	100
		Data science Lab	3	2	-	50	50
	Course VII-C	Python for Data science	3	3	25	75	100
		Python for Data science Lab	2	2	-	50	50

K. Bhalla

1. Vijayadev

2. Anshu

3.

4. ~~PSA~~

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6.

7. P. Ajay

8. P. Bharu Sru

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DEPARTMENT OF COMPUTER SCIENCE

(DATA SCIENCE)

COURSE STRUCTURE - 2023-24

B.SC. (W.E.F 2020-21 Batch)

SEMESTERS –V

YEAR	Course	Title	Teaching Hours	Credits	Mid Sem Exam	Sem End Exam	Total Marks
III YEAR Semester V	Course VI-A	Data Analytics with Tableau	3	3	25	75	100
		Data Analytics with Tableau Lab	3	2	-	50	50
	Course VII-A	AI Concepts and Techniques with Python	3	3	25	75	100
		AI Concepts and Techniques with Python Lab	3	2	-	50	50

(OR)

YEAR	Course	Title	Teaching Hours	Credits	Mid Sem Exam	Sem End Exam	Total Marks
III YEAR Semester V	Course VI-B	Supervised ML with Python	3	3	25	75	100
		Supervised ML with Python Lab	3	2	-	50	50
	Course VII-B	Unsupervised ML with Python	3	3	25	75	100
		Unsupervised ML with Python Lab	3	2	-	50	50

(OR)

YEAR	Course	Title	Teaching Hours	Credits	Mid Sem Exam	Sem End Exam	Total Marks
III YEAR Semester V	Course VI-C	NLP with Python	3	3	25	75	100
		NLP with Python Lab	3	2	-	50	50
	Course VII-C	Deep Learning Neural Networks with Python	3	3	25	75	100
		Deep Learning Neural Networks with Python Lab	2	2	-	50	50

K. Bhallu

1. Vijayadeep

2. Anshu

3.

4. ~~ISA~~

5.

6.

7. P. Ajay

8. P. Bharu Sri

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SEMESTER – I, II, III & IV
BLUE PRINT FOR
DEPARTMENT OF COMPUTER SCIENCE
MODEL PAPER
FOR SEMESTER END EXAMINATIONS

S.NO.	UNIT NO	SHORT QUESTIONS			ESSAY QUESTIONS		
		No of Questions	Marks allotted	Total marks	No of Questions	Marks allotted	Total Marks
1	I	02	04	08	02	08	16
2	II	01	04	04	02	08	16
3	III	02	04	08	02	08	16
4	IV	01	04	04	02	08	16
5	V	02	04	08	02	08	16

Section –A: Out of 8 Questions 5 has to be answered.

5 x 4=20 M

Section –B: Internal Choice (either / or) and 1 Question from each unit, 5 Questions has to be answered.

5 x 8=40 M

K. Bhadrachari

1. *Prasanna*

2. *Arjun*

3.

4. *Prasanna*

5.

6.

7. *P. Ajay*

8. *P. Bharu Sri*

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SEMESTER – V
BLUE PRINT FOR
DEPARTMENT OF COMPUTER SCIENCE
MODEL PAPER
FOR SEMESTER END EXAMINATIONS

S.NO	UNIT NO	SHORT QUESTIONS			ESSAY QUESTIONS		
		No of Questions	Marks allotted	Total marks	No of Questions	Marks allotted	Total Marks
1	I	02	05	10	02	10	20
2	II	01	05	05	02	10	20
3	III	02	05	10	02	10	20
4	IV	01	05	05	02	10	20
5	V	02	05	10	02	10	20

Section –A: Out of 8 Questions 5 has to be answered.

5 x 5=25 M

Section –B: Internal Choice (either / or) and 1 Question from each unit, 5 Questions has to be answered.

5 x 10=50 M

E. Shellen

1. *Prityadep*
2. *Ankur*

3.

4. *P. S. S.*

5.

6.

7. *P. Gay*
8. *P. Bharu Sri*

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

LIST OF EXAMINERS AND PAPER SETTERS

1.	Vijayadeep Gummadi	Lecturer in computer science	SRR & CVR GDC(A), Vijayawada, Krishna Dt. Mobile: 9030561156
2.	Smt. M.Rajani	Lecturer in computer science	SCIM Government Degree College, Tanuku, W.G.Dt. Mobile: 9885436464
3.	Sri Gentem Varaprasad	Lecturer in computer science	Govt Degree college, Razole, E.G.Dt. Mobile:9553992154
4.	P. Arun Kumar	Lecturer in computer science	GDC, Kovvur, East Godavari Dt. Mobile: 9502035544
5.	Dr. K. V. Sobha Rani	Lecturer in Computer Applications	PR Government Degree College (A), Kakinada, E.G.Dist. Mobile: 8500856417.
6.	Sri. N.S.V.N.A Kumar	Lecturer in computer science	S.K.S.D.Mahila Kalashala UG& P.G Colleger, Tanuku, W.G.Dt. Mobile:9491371200
7.	Dr. M. Pramod Kumar	Lecturer in Computer Applications	SRR & CVR GDC(A), Vijayawada, Krishna Dt. Mobile: 9492347719
8.	Smt A. Madhavi	Lecturer in computer Applications	Government Degree College (W), Hindupur, Anantapur Dist. Mobile: 9949672448

K. Bhalla

1. Vijayadeep

2. Arun Kumar

3.

4. P. Arun Kumar

5.

6.

7. P. Arun Kumar

8. P. Arun Kumar

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2023-24

DEPARTMENT OF COMPUTER SCIENCE

PO 1. Problem analysis: Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematics, humanities and Sciences.

PO 2. Design/development of solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 3. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 4. Modern tool usage: Create, select, and apply appropriate techniques, resources, IT tools including development, design, and prediction and modelling to real world activities with an understanding of the limitations.

PO 5. Environment and sustainability: Understand the impact of the professional problem solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 6. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 7. Efficient Communication & Life Skills: Apply ethical principles and commit to professional ethics and responsibilities and norms of the practice.

PO 8. Life-long learning: Learn “how to learn”: Self-motivated and self-directed learning. Adapt to the ever emerging demands of work place and life.

PROGRAM SPECIFIC OUTCOMES

Programme Specific Outcomes (PSOs) for Bachelor of Science(B.Sc) programme in Computer Science typically focus on specific knowledge, skills, abilities, and attributes that students are expected to acquire by the time they complete a specific educational program or course of study.

Computer Systems Knowledge: Graduates will have a solid foundation in computer architecture, operating systems, and computer networks, enabling them to understand and optimize the performance of computer systems.

Programming Proficiency: Graduates will be proficient in various programming languages and paradigms, enabling them to develop software applications and systems across different domains.

Database and web development Graduates will be proficient in database design, management, and querying, including the use of relational database management systems (RDBMS) and they will have the skills to develop web applications and have a strong understanding of web technologies, including HTML, CSS, JavaScript, and web frameworks.

Machine Learning and Data Analysis: Graduates will be familiar with machine learning concepts and data analysis techniques, allowing them to apply data-driven approaches in various fields.

COURSE OUTCOMES:

S.No.	Course Name	Course Outcomes
1	Course 1 : Essentials and Applications of Mathematical, Physical and Chemical Sciences	CO-1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures. CO-2. 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 CO-3. To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures. CO-4. To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures. CO-5. Principles can be used to explain and predict phenomena in different contexts. CO-6. To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.
2	Course 2: Advances in Mathematical, Physical and Chemical Science	CO-1. 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. CO-2. Understand the different sources of renewable energy and their generation processes and advances in nanomaterial's and their properties, with a focus on quantum dots. CO-3. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working

		<p>principles of Nano sensors. Explore the effects of chemical pollutants on ecosystems and human health.</p> <p>CO-4. 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.</p> <p>CO-5. Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics. Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite)</p>
3	Course 3: Problem Solving using C	<p>CO-1. Understand the working of a digital computer and Fundamental constructs of Programming.</p> <p>CO-2. Analyze and develop a solution to a given problem with suitable control structures.</p> <p>CO-3. Apply the derived data types in program solutions.</p> <p>CO-4. Use the 'C' language constructs in the right way.</p> <p>CO-5. Apply the Dynamic Memory Management for effective memory utilization</p>
4	Course 4: Digital Logic Design	<p>CO-1. Understand how to Convert numbers from one radix to another radix and perform arithmetic operations.</p> <p>CO-2. Simplify Boolean functions using Boolean algebra and k- maps.</p> <p>CO-3. Design adders and subtractors circuits.</p> <p>CO-4. Design adders and subtractors circuits.</p> <p>CO-5. Use flip flops to design registers and counters.</p>
5	Course 3: Database Management System(DBMS)	<p>CO-1. Understand fundamental concepts of various databases and its applications</p> <p>CO-2. Design ER models for real time scenarios.</p> <p>CO-3. Design relational models for various real time scenarios</p> <p>CO-4. Apply various constraints on tables using SQL queries</p> <p>CO-5. Create a small database using structured query language.</p>

6	Course 4: Object Oriented Programming through JAVA	CO-1. Understand the benefits of a well-structured program and features of java CO-2. Understand underlying principles of object-oriented programming in java CO-3. Develop problem-solving and programming skills using OOP concepts CO-4. Apply keywords of exception handling and OOP principles in solving real time problems CO-5. Develop the ability to solve real-world problems through software development in high-level
7	Course 5: Operating Systems	CO-1. Understand Operating System Architectural design and its services CO-2. Understand various process management concepts including scheduling, threading CO-3. Apply process scheduling techniques to efficiently run various applications CO-4. Analyze the concept of memory management techniques CO-5. Create various files in local host using file management concept and protect files using software
8	Course 6A: Web Interface Designing Technologies	CO-1. Understand and appreciate the web architecture and services. CO-2. Understand and appreciate the web architecture and services. CO-3. Demonstrate skills regarding creation of a static website and an interface to dynamic website. CO-4. Demonstrate skills regarding creation of a static website and an interface to dynamic website.
9	Course 7A: Web Applications Development using PHP & MYSQL	CO-1. Understand how to write a simple programs in PHP. CO-2. Understand how to use regular expressions, handle exceptions, and validate data using PHP. CO-3. Apply In-Built functions and Create User defined functions in PHP programming CO-4. Analyze PHP code with forms to generate dynamic content. CO-5. Create user defined databases using PHP and MYSQL
10	Course 6B: Internet of Things	CO-1. Appreciate the technology for IoT. CO-2. Understand various concepts, terminologies and architecture of IoT systems. CO-3. Understand various applications of IoT. CO-4. Learn how to use various sensors and actuators for design of IoT. CO-5. Learn how to connect various things to Internet.

11	Course 7B: Application Development using Python	<p>CO-1. Understand and appreciate the web architecture and services.</p> <p>CO-2. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.</p> <p>CO-3. Demonstrate proficiency in handling Strings and File Systems.</p> <p>CO-4. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.</p> <p>CO-5. Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.</p>
12	Course 6C: Data science	<p>CO-1. Develop relevant programming abilities.</p> <p>CO-2. Demonstrate proficiency with statistical analysis of data.</p> <p>CO-3. Develop the ability to build and assess data-based models.</p> <p>CO-4. Demonstrate skill in data management</p> <p>CO-5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively</p>
13	Course 7C: Python for Data science	<p>CO-1. Identify the need for data science and solve basic problems using Python built-in data types and their methods.</p> <p>CO-2. Design an application with user-defined modules and packages using OOP concept.</p> <p>CO-3. Employ efficient storage and data operations using NumPy arrays.</p> <p>CO-4. Employ efficient storage and data operations using NumPy arrays.</p> <p>CO-5. Do data pre-processing and visualization using Pandas</p>

**B.Sc(Computer Science)
Major**

SRI A.S. N. M GOVERNMENT COLLEGE, PALAKOL, W.G. DT
(Affiliated to Adikavi Nannaya University, Rajahmundry)
(Accredited with NAAC “B+” Grade with 2.67 CGPA)
I Semester

Course 1: Essentials and Applications of Mathematical, Physical and Chemical Sciences

UNIT I: ESSENTIALS OF MATHEMATICS: 9hrs

Complex Numbers: Introduction of the new symbol i – General form of a complex number – Modulus-Amplitude form and conversions Trigonometric Ratios: Trigonometric Ratios and their relations – Problems on calculation of angles Vectors: Definition of vector addition – Cartesian form – Scalar and vector product and problems Statistical Measures: Mean, Median, Mode of a data and problems

UNIT II: ESSENTIALS OF PHYSICS: 9hrs

Definition and Scope of Physics- Measurements and Units - 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

UNIT III: ESSENTIALS OF CHEMISTRY: : 9hrs

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

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

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.

UNIT V: ESSENTIALS OF COMPUTER SCIENCE: 9hrs

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.

Recommended books:

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

SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL DEPARTMENT OF COMPUTER SCIENCE						
Course Code	Course-1: Essentials of Mathematics, Physics, Chemistry & Computer Sciences			Programme & Semester I B.Sc. Computer Science(H) I Semester		
Teaching	Hours Allocated: 60 (Theory and Activities) (5 Hrs/wk)			L	T	P C
Pre-requisites	Basic knowledge about Mathematics, physics, Chemistry and Computer science			4	1	- 4

COURSE OBJECTIVES:

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

COURSE OUTCOMES: At the end of the course, the student will be able to

CO	Course Outcomes	Knowledge Level
CO1	Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.	K3
CO2	Employ the fundamental principles and concepts in various key domains of physics.	K3
CO3	Relate fundamental concepts encompassing various branches of chemistry in everyday life.	K3
CO4	Discover the intricate interrelationships and correlations among mathematics, physics, and chemistry in diverse practical scenarios.	K4
CO5	Illustrate various threats, vulnerabilities, and counter measures in the realm of network security.	K4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3					
CO2	3	3	3					
CO3	3	3	3					
CO4	3	3	3	3	3	3	3	3
CO5	3	3	3	3				

SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL
COURSE -1. ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES
SEMESTER-I, PAPER-1
B.Sc. HONOURS (COMPUTER SCIENCE)

TIME: 3 HOURS

MAX MARKS: 60

SECTION-A

Answer All Questions

20x1=20M

1. The value of $\left(\frac{1+i}{1-i}\right)^n =$
a) 0 b) -1 c) 1 d) -i
2. Find the value of $2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) =$
a) 1 b) -1 c) 2 d) 0
3. if $a=6i+2j+3k$ and $b=2i-9j+6k$ then find n a.b
a) 18 b) 15 c) 12 d) 14
4. Calculate the Mean of the Numbers 165,170,168,172,169,175,168,173
a) 168.75 b) 168.65 c) 178.75 d) 167.75
5. Unit of plane angle is a
a) Radian b) Steradian c) Centimetre d) Metre
6. In Newton's second law the rate of change of momentum of a body is directly proportional to the applied
a) Density b) Temperature c) Force d) Mass
7. Charge of an electron is
a) Positive b) Negative c) Neutral d) None
8. Velocity =
a) Distance/Time b) Pressure/Time c) Mass/Time
d) Displacement/Time
- 9) What does analytical chemistry focus on?
a) Developing new materials
b) Identifying and quantifying components in a substance
c) Exploring the behavior of radioactive elements
d) Understanding biological molecules
10. What is the primary role of enzymes in living organisms?
a) Energy production
b) Structural support
c) Speeding up chemical reactions
d) Informational roles
- 11) Which vitamin is essential for vision, healthy skin, and mucous membranes?
a) Vitamin C
b) Vitamin A
c) Vitamin D
d) Vitamin E
- 12) What is the role of unsaturated fats in the body?
a) Provide insulation
b) Act as an energy source
c) Form structural components
d) Regulate body temperature

13) ARPANET stands for?

- a) Advanced Research Project Agency Network
- b) Advanced Research Programmed Auto Network
- c) Advanced Research Project Automatic Network
- d) Advanced Research Project Authorized Network

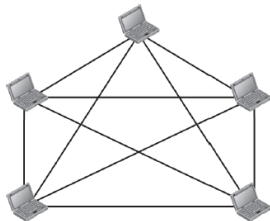
14) Which of the following is not a type of virus?

- a) Boot sector
- b) Polymorphic
- c) Multipartite
- d) Trojans

15) What is the full form of OSI?

- a) optical service implementation
- b) open service Internet
- c) open system interconnection
- d) operating system interface

16) Which network topology does this represent?



- a) Mesh
- b) Star
- c) Bus
- d) Ring

17) _____ equations are used to describe thermodynamic process

- a) differential
- b) Partial
- c) both a & b
- d) None of the above

18) Transistors Made with

- a) Insulators
- b) Conductors
- c) Semi conductors
- d) None of the above

19) What is the primary focus of the food and beverage industry in utilizing chemistry?

- a) Drug discovery
- b) Materials science
- c) Chemical manufacturing
- d) Enhancing food quality and safety

20) LED Stands for

- a) Light Emitting Diode
- b) Light Energy Diode
- c) Light Electric Diode
- d) None of the above

SECTION-B

Answer All Fill in the Blank Questions

10x1=10M

1. Formula for $\cos(A-B)$ = _____

2. Calculate Mode of the numbers 3,1,2,0,2,4,1,3,2,1 _____

3. In electro statics force (F) = _____

4. Range of visible light wave length From _____ To _____

5. Chemical reactions often involve the _____ of one or more substances into new substances.

6. _____ fats have one or more double bonds between carbon atoms.

7. Euler's Method is a basic technique used to approximate solutions of _____.

8. _____ is a method used in pharma Industry to develop new drugs by structures of Biological molecules.

9. A computer _____ is a malicious code which self-replicates by copying itself to other programs.

10. TCP/IP Stands for _____

SECTION-C

Answer All True or False Questions

10x1=10M

1. $T \bar{T} = |T|^2$ (True or False)
2. $\sin 3A = 3\sin A - 4\sin^3 A$ (True or False)
3. Force = Mass \times Acceleration (True or False)
4. A car moving in straight at a constant speed, then net force acting on the body is zero (True or False)
5. Chemistry is often referred to as the central science because it bridges the gap between physics and mathematics. (True or False)
6. The Aufbau Principle states that electrons fill higher energy orbitals first before lower energy orbitals. (True or False)
7. Vitamins as biomolecules are essential for various metabolic processes (True or False)
8. Mathematical Models are used to analyze Medical data (TRUE/FALSE)
9. Firstly Internet was connected through 13 computers in 1969. (TRUE / FALSE)
10. RAM is volatile memory. (TRUE / FALSE)

SECTION-D

Answer All Very Short Answer Questions

10x1=10M

1. Let $a = 2i - j + k$ and $b = 3i + 4j - k$. If θ is the Angle between a and b then find $\sin \theta$
2. Prove that $\sin^2(52\frac{1}{2}) - \sin^2(22\frac{1}{2}) = \frac{\sqrt{3}+1}{4\sqrt{2}}$
3. State zeroth law of thermodynamics
4. What is Doppler effect ?
5. How does chemistry contribute to drug discovery?
6. How does chemistry contribute to environmental protection?
7. What are the areas in which Chemical nanosensors can be employed?
8. Write any two uses of Physics in Robotics?
9. What are the Types of Networks?
10. What is Cryptography?

SECTION-E

Answer The Matching Questions

10x1=10M

1. If $z = 3 - 5i$ () $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) xh$
2. Mode of Grouped data () then $z^3 - 10z^2 + 58z - 136 = 0$
3. Many substances especially metals emit electrons when exposed to a suitable frequency of light (radiation) is called as () uncertainty principle
4. According to uncertainty principle the product of uncertainty in momentum and uncertainty in position is $\geq h/4\pi$ is called as () Photo electric effect
5. Inorganic Chemistry () study of elements that do not contain carbon-hydrogen bonds.
6. Vitamin B6 () Pyridoxine
7. Which type of mathematical Modeling is used to study the

- Behaviour of electrons () Integrated Circuits
- 8.** ICs () Complex Analysis
- 9.** Software intentionally designed
to cause disruption to a computer () malware
- 10.** Network security system that monitors
and controls incoming and outgoing network
Traffic () firewall

SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL						
DEPARTMENT OF COMPUTER SCIENCE						
Course Code	Course-2: Advances in Mathematical, Physical & Chemical Sciences			Programme & Semester I B.Sc. Computer Science(H) I Semester		
Teaching	Hours Allocated: 60 (Theory and Activities) (5 Hrs/wk)			L	T	P C
Pre-requisites	Basic knowledge about Mathematics, physics, Chemistry and Computer science			4	1	- 4

COURSE OBJECTIVES:

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

COURSE OUTCOMES: At the end of the course, the student will be able to

CO	Course Outcomes	Knowledge Level
CO1	Use mathematical concepts to model and solve real world problems in the fields of physics and chemistry	K3
CO2	Demonstrate an advanced understanding of the concepts and recent developments in renewable energy generation	K3
CO3	Apply advanced techniques in design of drugs, nano sensors, and catalysis and pollutant remediation.	K3
CO4	Develop models on principles of mathematics, physics and chemistry in diverse applications	K6
CO5	Implement knowledge of number systems, signals, error detection, and networking devices to communication technologies	K3

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3				3
CO2	3	3	3	3	3			3
CO3	3	3	3	3	3			3
CO4	3	3	3	3	3		3	3
CO5	3	3	3	3				

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I Semester

Course 2: Advances in Mathematical, Physical and Chemical Sciences

UNIT I: ADVANCES IN BASICS MATHEMATICS 9hrs

Straight Lines: Different forms – Reduction of general equation into various forms –Point of intersection of two straight lines Limits and Differentiation: Standard limits – Derivative of a function –Problems on product rule and quotient rule

Integration: Integration as a reverse process of differentiation – Basic methods of integration Matrices: Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose of a matrix and determinants

UNIT II: ADVANCES IN PHYSICS: 9hrs

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

UNIT III: ADVANCES IN CHEMISTRY: 9hrs

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

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

Mathematical Modelling applications in physics and chemistry Application of Renewable energy: Grid Integration and Smart Grids, Application of nanotechnology: Nanomedicine, Application of biophysics: Biophysical Imaging, Biomechanics, Neurophysics, Application of medical physics: Radiation Therapy, Nuclear medicine Solid waste management, Environmental remediation- Green Technology, Water treatment.

UNIT V: ADVANCEDAPPLICATIONS OF COMPUTER SCIENCE 9hrs

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

Recommended books:

1. Coordinate Geometry by S.L.Lony, Arihant Publications
2. Calculus by Thomas and Finny, Pearson Publications
3. Matrices by A.R.Vasishtha and A.K.Vasishtha, Krishna PrakashanMedia (P) Ltd.
4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle
5. "Energy Storage: A Nontechnical Guide" by Richard Baxter
6. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A. Bohara
7. "Biophysics: An Introduction" by Rodney Cotterill
8. "Medical Physics: Imaging" by James G. Webster
9. "Shape Memory Alloys: Properties and Applications" by Dimitris C. Lagoudas
10. Nano materials and applications by M.N.Borah
11. Environmental Chemistry by Anil.K.D.E.
12. Digital Logic Design by Morris Mano
13. Data Communication & Networking by BahrouzForouzan.

SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL

COURSE -2. ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCE

SEMESTER-I, PAPER-II

B.Sc. Major Honours (COMPUTER SCIENCE)

TIME: 3 HOURS

MAX MARKS: 60

SECTION-A

Answer All Questions

20x1=20M

1) Intersection point of the straight lines $3x+5y-6=0$ and $5x-y-10=0$ is

- a) (3,0) b) (2,0) c) (5,-1) d) (6,3)

2) $\frac{d}{dx}(e^{3x}) =$

- a) e^{3x} b) $-e^{3x}$ c) $3e^{3x}$ d) $3x$

3) $\int x^3 dx =$

- b) x^3 b) $\frac{x^4}{4}$ c) x^4 d) $3x^4$

4) A Matrix having number of rows equals to number of columns is called

- a) Rectangular Matrix b) Square Matrix c) Row Matrix d) Identity Matrix

5) What is the unit of energy?

- a) Meter b) Newton c) Joule d) Kelvin

6) One Nano meter =

- a) 10^{-10}m b) 10^{-6}m c) 10^{-3}m d) 10^{-9}

7) Photovoltaic cells (Solar cells) are devices which are made with

- a) Semi conductors b) conductors c) insulators d) none

8) In Radiation therapy most often uses

- a) UV Rays b) Gamma Rays c) X-Rays d) Sound Waves

9) What is the primary focus of Structure-Based Drug Design (SBDD)?

- a) Analysing ligand structures b) Identifying potential targets
c) Determining target protein structures d) Synthesizing lead compound

10) In the drug-discovery process, which phase involves evaluating the absorption, distribution, metabolism, excretion (ADME), and toxicity profiles of lead compounds?

- a) Discovery phase b) Development phase c) Registry phase d) Experimental testing phase

11) In biotechnology, chemical biology is used for creating:

- a) Engineered organisms b) Drug targets c) Biosensors d) Chemical probes

a) Enhancing food safety b) Monitoring pollutants
c) Improving electronic device performance d) Detecting explosives

a) Peak Load Management b) Plant Load Management
c) Power leakage Management d) Plant Leakage Management

a) Legs b) Brain c) Hands d) Stomach

a) Non Radioactive Materials b) Organic Materials

c) Radioactive Materials d) None of the above

a) Drug discovery b) Material Science

c) Chemical Manufacture d) Enhancing food quality and safety

a) $(140)_{10}$ b) $(141)_{10}$ c) $(142)_{10}$ d) $(130)_{10}$

a) $(11.6875)_{10}$ b) $(11.5874)_{10}$ c) $(10.9876)_{10}$ d) $(10.7893)_{10}$

a) 7 b) 5 c) 4 d) 620

a) Firewall b) bridge c) hub d) router

1. The slope of the equation of a line $2x-6y+3=0$ is _____ .
2. If $A = A^T$, then the matrix A is called _____
3. In radiation Therapy most often uses _____
4. Give examples of renewable energy sources _____
5. _____ is a method used in the pharmaceutical industry to develop new drugs by analyzing the three-dimensional structures of biological molecules.

6. In synthetic biology, chemical biology is utilized to design and construct novel biological systems with specific _____.
7. OMS Means _____
8. In Chemical Manufacturing the application of chemical principles involve
The design and optimization of large scale _____
9. The decimal equivalent of the binary number $(1011.011)_2$ is _____
10. $(170)_{10}$ is equivalent to _____ in hexadecimal form

SECTION-C

Answer All True or False Questions.

10x1=10M

1. Let A and B be invertible matrices then $(AB)^{-1} = B^{-1}A^{-1}$ (TRUE OR FALSE)
2. $\lim_{x \rightarrow \infty} \left(\frac{\sin x}{x} \right) = 3$ (TRUE OR FALSE)
3. Solar energy is the nonrenewable energy. (TRUE OR FALSE)
4. Energy efficient materials and devices reducing green house gas emissions.(TRUE OR FALSE)
5. In the drug-discovery process, the discovery phase focuses on evaluating compounds in in vitro and in vivo models.(TRUE OR FALSE)
6. Nanosensors operate on a larger scale than 100 nanometers for better sensitivity.(TRUE OR FALSE)
7. The Smart grid will help consumers manage their electricity bill (TRUE OR FALSE)
8. Chemistry has minimal impact on quality ,taste and safety of food products (true or False)
9. A device that is used to connect a number of LANs is.called a router(TRUE OR FALSE)
10. Hexadecimal number system is a base 16 number system (TRUE OR FALSE)

SECTION-D

Answer All Very Short Answer Questions.

10x1=10M

1. Write the equation of a straight line in Slope –intercept form
2. Define Transpose of a Matrix.
3. Explain the basic structure of quantum Dot.
4. What are shape memory materials?
5. What is the main objective of Computer-Aided Drug Design (CADD) in the drug-discovery process?
6. Describe the application areas of Biological Nano Sensors and provide an example of their use in healthcare.
7. What is Smart Grid?
8. What is the primary focus of chemistry in chemical manufacturing beyond
The production of chemicals?
9. Define a router.
10. List out functionalities of bridge.

SECTION-E

Answer The Matching Questions

10x1=10M

- | | | |
|--|-----|--|
| 1. $\int x dx$ | () | a) $2x$ |
| 2. $\frac{d}{dx}(x^2)$ | () | b) $\frac{x^2}{2}$ |
| 3. The by products of hydrogen fuel cell is heat and electricity and | () | c) electricity |
| 4. Solar cells directly converts light into | () | d) Water |
| 5. Protein-Ligand Docking | () | (e) Large-scale screening of small molecules |
| 6. Chemical Genomics | () | (f) Predict how ligands interact |
| 7. The general equation for Exponential Decay is | () | (g) Discarded Material |
| 8. Solid Waste is the | () | (h) $N(t) = N_0 e^{-rt}$ |
| 9. Router works at ---- layer of OSI model | () | (i) Data link layer |
| 10. Bridge works at ---- Layer of OSI model | () | (j) Network layer |

SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL**DEPARTMENT OF COMPUTER SCIENCE**

Course Code	Course 3: Problem Solving using C	Programme & Semester I B.Sc. Computer Science(H) II Semester			
Teaching	Hours Allocated: 60 (Theory and Activities) (5 Hrs/wk)	L	T	P	C
Pre-requisites	Basic knowledge in Mathematics and Logical Skills	3	-	2	4

Course Objectives:

The students will learn about Computer components and program development steps. They will understand the concepts of algorithms, flowcharts and basic concepts in C Programming language like operators, control statements and loops. They can develop modular and readable C programs using the concepts like pointers, functions, structures and files.

Course Outcomes: At the end of the course, the student will be able to

CO	Course Outcomes	Knowledge Level
CO1	Demonstrate the working of a digital computer and understand the Fundamental constructs of Programming.	K3
CO2	Use the 'C' language constructs in the right way.	K3
CO3	Apply logical skills to analyze a given problem using arrays and strings	K3
CO4	Develop various user defined functions to solve a given problem.	K6
CO5	Examine Dynamic Memory Management for effective memory utilization	K4

CO-PO Mapping:

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

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II Semester

Course 3: Problem Solving using C

UNIT-I

Introduction to computer and programming: Introduction, 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

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.

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

UNIT-IV

Functions: Function Prototype, definition and calling. Return statement. Nesting of functions. Categories of functions. Recursion, Parameter Passing by address & by value. Local and Global variables. Storage classes: automatic, external, static and register. Pointers: Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic. Pointers and arrays, pointers and functions.

UNIT-V

Dynamic Memory Management: Introduction, Functions-malloc, calloc, realloc, free Structures: Basics of structure, structure members, accessing structure members, nested structures, array of 10 | P a structures, structure and functions, structures and pointers. Unions - Union definition; difference between Structures and Unions.

Text Books:

1. E. Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill, 6 thEdn, ISBN-13: 978-1- 25- 90046-2 2. Herbert Schildt, —Complete Reference with C, Tata McGraw Hill, 4th Edn., ISBN- 13: 9780070411838, 2000 3. Computer fundamentals and programming in C, REEMA THAREJA, OXFORD UNIVERSITY PRESS

Additional topic: Basic file and file operations

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&HuubertL.Cooper: The Spirit of C An Introduction to modern Programming, Jaico Pub. House,1996. 4. Y kanithkar, let us C BPB, 13 th edition-2013, ISBN:978-8183331630,656 pages.

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II Semester

Course 3: Problem Solving using C Practical

List of Experiments

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.

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II Semester
Course 3: Problem Solving using C Model Paper

Time: 3Hrs

Max.marks:60

Section - A

Answer any FIVE question

5X4 = 20M

1. Differentiate compiler and interpreter.
2. Define an Algorithm. Explain features of an algorithm?
3. List out conditional statements with syntax of each.
4. Define array. Explain one dimensional array with example.
5. Explain character handling functions.
6. Define recursion. Write a c program to find factorial of a given number using recursion.
7. Define pointer. How can we access values using pointer.
8. Differentiate structure and union in C.

Section - B

Answer ALL following question

5X8 = 40M

9. a) Explain generations of programming languages.

(OR)

b) Define operator. Explain unary operators with example.
10. a) Demonstrate break and continue statements with example.

(OR)

b) Explain about iterative statements available in C.
11. a) Write a c program to multiply two matrices.

(OR)

b) Define string? Explain various string handling functions available in C.
12. a) Define a function. Explain the passing parameter mechanism.

(OR)

b) Define pointer. Describe pointer arithmetic concept in C.
13. a) Explain concept of structure with example

(OR)

b) Compare malloc(), calloc(), realloc() functions in C.

SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL
DEPARTMENT OF COMPUTER SCIENCE

Course Code	Course 4: Digital Logic Design	Programme & Semester I B.Sc.Computer Science(H) II Semester			
Teaching	Hours Allocated: 60 (Theory and Activities) (5 Hrs/wk)	L	T	P	C
Pre-requisites	Basic knowledge in Mathematics	3	-	2	4

COURSE OBJECTIVES:

This course helps students to learn the theory and operation of digital electronics, number systems, logic gates, gate level minimization, combinational and sequential logic circuits.

Course Outcomes: At the end of the course, the student will be able to

CO	Course Outcomes	Knowledge Level
CO1	Identify the process to convert numbers from one radix to another radix and perform arithmetic operations.	K2
CO2	Simplify Boolean functions using Boolean algebra and k- maps.	K3
CO3	Design adders and subtractors circuits.	K6
CO4	Design encoder, decoder, multiplexer and demultiplexer circuits	K6
CO5	Use flip flops to design registers and counters.	K3

CO-PO Mapping:

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

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II Semester
Course 4: Digital Logic Design

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.

UNIT – II

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

UNIT – III

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

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.

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, universal shift register, design of ripple counters, variable modulus counters.

Additional Topic: Five variable K-Map

Text Books:

1. M. Morris Mano, Michael D Ciletti, “Digital Design”, 5th edition, PEA. Reference Books 1. Kohavi, Jha, “Switching and Finite Automata Theory”, 3rd edition, Cambridge. 2. 2. Leach, Malvino, Saha, “Digital Principles and Applications”, 7th edition, TMH. 3. 3. Roth, “Fundamentals of Logic Design”, 5th edition, Cengage.

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II Semester
Course 4: Digital Logic Design Practical

List of Experiments:

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

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

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

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III Semester

Course4: Digital Logic Design Model Paper

Time: 3Hours

Max.Marks:60

Section - A

Answer any5 questions

5X4 =20M

1. Explain about Self complementing code and gray code.
2. Convert $(5064)_9$ into base 5.
3. Convert $F(x) = x + y'z$ into canonical form.
4. Define full Subtractor. Give its implementation.
5. Design half adder using only NAND gates.
6. Define multiplexer. Construct 4-to-1 multiplexer using logic gates.
7. Differentiate between Latch and flip flop.
8. Write the design steps of synchronous counters with suitable examples.

Section - B

Answer the following question

5X8 =40M

9. a) Convert the following numbers with the given radix to decimal.

i) $(4433)_5$ ii) $(1199)_{12}$

(OR)

- b) State and prove De Morgan's theorem.

10. a) Reduce using mapping the following expression and implement the real minimal expression in Universal logic. $F = \sum m(0, 2, 4, 6, 7, 8, 10, 12, 13, 15)$

(OR)

- b) Obtain the simplified expression in product of sums.

i) $F(A,B,C,D) = \pi(0,1,2,3,4,10,11)$

ii) $F(A,B,C,D) = \pi(1,3,5,7,13,15)$

11. a) Explain concept of combinational circuits. Implement half adder circuit.

(OR)

- b) Design Full adder and Full subtractor by using Universal Gates.

12. a) Draw the logic diagram of a 2 to 4 line decoder using NOR gates including an enable input.

(OR)

- b) Define decoder. Construct 3x8 decoder using logic gates.

13. a) Design a SR flip flop using NAND gates. Explain the operation of the SR flip flop with the help of characteristic table.

(OR)

- b) Design T Flip Flop using Logic Gates.

B.Sc.(Computer Science)
(MPCS & MCCS)

SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL DEPARTMENT OF COMPUTER SCIENCE						
Course Code	Course-III: Database management System			Programme & Semester II B.Sc.Computer Science III Semester		
Teaching	Hours Allocated: 60 (Theory and Activities) (6 Hrs/wk)			L	T	P C
Pre-requisites	Basics on Programming knowledge and problem solving skills.			3	1	2 5

COURSE OBJECTIVES:

The main objective of this course is to enable students to the fundamental concepts of database analysis and design. To recognize the importance of database analysis and design in the implementation of any Database application and to understand the process of drawing the ER-Diagrams. It also gives the knowledge of the roles of transaction processing and concurrency control.

COURSE OUTCOMES:

CO	Course Outcomes	Knowledge Level
CO1	Identify and Understand fundamental concepts of various databases and its applications.	K2
CO2	Design ER models for real time scenarios.	K6
CO3	Design relational models for various real time scenarios.	K6
CO4	Apply various constraints on tables using SQL queries.	K3
CO5	Create a small database using structured query language.	K6

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	3	2				3
CO2	3	3	3	3				3
CO3	3	3	3	3				3
CO4	3	2	3	2				3
CO5	3	3	3	3				3

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III Semester

Database Management Systems

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

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

UNIT III: Relational Model: Introduction, 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 3 rd normal form.

UNIT IV: Structured Query Language: Introduction, History of SQL Standard, 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.

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.

Additional Topics: Boyce Codd Normal Form (BCNF), Transactions management (ACID properties)

TEXT BOOKS:

1. Database System Concepts by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill
2. Database Management Systems by Raghu Ramakrishnan, McGrawhill

Reference Books:

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

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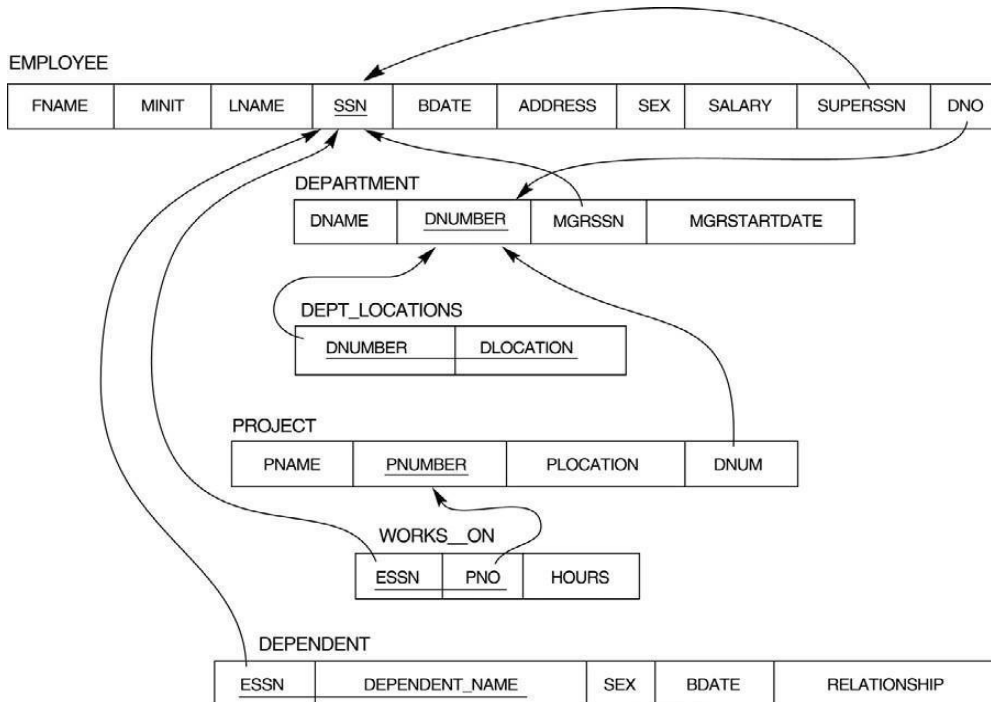
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III Semester

Database Management Systems Practical

Syllabus:

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 - COMPANY3.



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 'ProductX' 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.
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.

Lab Evaluation Procedure

1. Record:	10 Marks
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2. Procedure cum Execution:	30 Marks
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3. Viva:	10 Marks
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Total	50 Marks
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III Semester

Database Management Systems Model Paper

Time: 3Hours

Max.Marks:60

Section - A

Answer any 5 questions

5X4 =20M

1. Explain drawbacks of file based system.
2. Explain the concept of entity and entity set with suitable example.
3. Define inheritance. Explain multiple inheritance.
4. What are the advantages of Relational algebra? Explain.
5. Explain various types of keys.
6. Briefly explain views.
7. Explain various aggregate functions.
8. Explain various data types in PL/SQL.

Section - B

Answer the following question

5X8 =40M

9. a) Describe the classification of database management system.

(OR)

- b) Define data model. Explain various data models.

10. a) Describe building blocks of an entity relationship diagram.

(OR)

- b) Explain about various attribute classification.

11. a) What is Functional Dependency? Examine 1NF, 2NF with example.

(OR)

- b) Define relational model. Explain relational algebra operations.

12. a) Define SQL. Explain DML commands with example queries.

(OR)

- b) Explain selection and projection operations with example.

13. a) Explain steps in creating a PL/SQL Program.

(OR)

- b) Explain about Triggers and types of triggers.

SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL DEPARTMENT OF COMPUTER SCIENCE					
Course Code	Course-4: Object Oriented Programming using Java	Programme & Semester II B.Sc.Computer Science IV Semester			
Teaching	Hours Allocated: 60 (Theory and Activities) (6 Hrs/wk)	L	T	P	C
Pre-requisites	Basics on Programming knowledge and problem solving skills.	3	1	2	5

COURSE OBJECTIVES:

- The main aim of this course is to understand the basic concepts and fundamentals of platform independent object oriented language. To demonstrate skills in writing programs using exception handling techniques and multithreading. To understand streams and efficient user interface design techniques.

COURSE OUTCOMES:

CO	Course Outcomes	Knowledge Level
CO1	Understand the benefits of a well-structured program and features of java	K2
CO2	Interpret the underlying principles of object-oriented programming in java	K3
CO3	Develop problem-solving and programming skills using OOP concepts	K6
CO4	Apply keywords of exception handling and OOP principles in solving real time problems	K3
CO5	Develop the ability to solve real-world problems through software development in high-level	K6

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2				3
CO2	3	2	3	2				3
CO3	3	3	3	3				3
CO4	3	2	3	2				3
CO5	3	3	3	3				3

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IV Semester

Paper IV: Object Oriented Programming Using Java

Time: 3Hours

Max.Marks:60

UNIT I:

Introduction to Java: Features of Java, The Java virtual Machine, Parts of Java

Naming Conventions and Data Types: Naming Conventions in Java, Data Types in Java, Literals
Operators in Java: Operators, Priority of Operators. **Control Statements in Java:** if... else Statement, do... while Statement, while Loop, for Loop, switch Statement, break Statement, continue Statement, and return Statement. **Input and Output:** Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format(). **Arrays:** Types of Arrays, Three Dimensional Arrays (3D array), and array name. length, Command LineArguments

UNIT II:

Strings: Creating Strings, String Class Methods, String Comparison, Immutability of Strings.

Introduction to OOPs: Problems in Procedure Oriented Approach, Features of Object- Oriented Programming System (OOPS).

Classes and Objects: Object Creation, Initializing the Instance Variables, Access Specifiers, Constructors.

Methods in Java: Method Header or Method Prototype, Method Body, Understanding Methods, Static Methods, Static Block, The keyword ‘this’, Instance Methods, Passing Primitive Data Types to Methods, Passing Objects to Methods, Passing Arrays to Methods, Recursion, Factory Methods.

Inheritance: Inheritance, The keyword ‘super’, The Protected Specifier, Types of Inheritance.

UNIT III:

Polymorphism: Polymorphism with Variables, Polymorphism using Methods, Polymorphism with Static Methods, Polymorphism with Private Methods, Polymorphism with Final Methods, final Class.

Type Casting: Types of Data Types, Casting Primitive Data Types, Casting Referenced Data Types, The Object Class. **Abstract Classes:** Abstract Method and Abstract Class.

Interfaces: Interface, Multiple Inheritance using Interfaces. **Packages:** Package, Different Types of Packages, The JAR Files, Interfaces in a Package, Creating Sub Package in a Package, Access Specifiers in Java, Creating API Document. **Exception Handling:** Errors in Java Program, Exceptions, throws Clause, throw Clause, Types of Exceptions, Re – throwing anException.

UNIT – IV

Streams: Stream, Creating a File using FileOutputStream, Reading Data from a File using FileInputStream, Creating a File using FileWriter, Reading a File using FileReader, Zipping and Unzipping Files, Serialization of Objects, Counting Number of Characters in a File, File Copy, File Class

Threads: Single Tasking, Multi-Tasking, Uses of Threads, Creating a Thread and Running it, Terminating the Thread, Single Tasking Using a Thread, Multi-Tasking Using Threads, Multiple Threads Acting on Single Object, Thread Class Methods, Deadlock of Threads, Thread Communication, Thread Priorities, thread Group, Daemon Threads, Applications of Threads, Thread Life Cycle.

UNIT V:

Applets: Creating an Applet, Uses of Applets, <APPLET> tag, A Simple Applet, Applet Parameters, draw shapes using applet.

Java Database Connectivity: Database Servers, Database Clients, JDBC (Java Database Connectivity), Working with Oracle Database, Working with MySQL Database, Stages in a JDBC Program, Registering the Driver, Connecting to a Database, Preparing SQL Statements, Using jdbc– odbc Bridge Driver to Connect to Oracle Database, Retrieving Data from MySQL Database, Retrieving Data from MS Access Database, Stored Procedures and Callable Statements, Types of ResultSets.

Additional Topic: Basic structure of Collection framework concepts

TEXT BOOKS:

1. Core Java: An Integrated Approach, Authored by Dr. R. Nageswara Rao & Kogent Learning Solutions Inc.
2. E. Balaguruswamy, Programming with JAVA, A primer, 3e, TATA McGraw-Hill Company.

REFERENCES:

1. John R. Hubbard, Programming with Java, Second Edition, Schaum's outline Series, TMH.
2. Deitel & Deitel. Java TM: How to Program, PHI (2007)

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IV Semester

Object Oriented Programming Using Java Practicals

Time: 3Hours

Max: 50M

1. Write a program to read *Student Name, Reg.No, Marks [5]* and calculate *Total, Percentage, Result*. Display all the details of students
2. Write a program to perform the following String Operations
 - a. Read a string
 - b. Find out whether there is a given substring or not
 - c. Compare existing string by another string and display status
 - d. Replace existing string character with another character
 - e. Count number of words in a string
3. Java program to implements Addition and Multiplication of two N X N matrices.
4. Java program to demonstrate the use of Constructor.
5. Calculate area of the following shapes using method overloading.
 - a. Triangle
 - b. Rectangle
 - c. Circle
 - d. Square
6. Implement inheritance between *Person (Aadhar, Surname, Name, DOB, and Age)* and *Student (Admission Number, College, Course, Year)* classes where ReadData(), DisplayData() are overriding methods.
7. Java program for implementing Interfaces
8. Java program on Multiple Inheritance.
9. Java program for to display *Serial Number from 1 to N* by creating two Threads
10. Java program to demonstrate the following exception handlings
 - e. Divided by Zero
 - f. Array Index Out of Bound
 - g. File Not Found
 - h. Arithmetic Exception
 - i. User Defined Exception

11. Create an Applet to display different shapes such as Circle, Oval, Rectangle, Square and Triangle.
12. Write a program to create ***Book (ISBN, Title, Author, Price, Pages, Publisher)*** structure and store book details in a file and perform the following operations
 - j. Add book details
 - k. Search a book details for a given ISBN and display book details, if available
 - l. Update a book details using ISBN
 - m. Delete book details for a given ISBN and display list of remaining Books

Lab Evaluation Procedure

1. Record:	10 Marks
2. ProcedurecumExecution:	30 Marks
3. Viva:	10 Marks
Total	<hr/> 50 Marks

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IV Semester
Object Oriented Programming Using Java Model Paper

Section – A

Max. Marks: 60

Answer any 5 questions

5X4 =20M

1. Explain about JVM architecture.
2. Define a string. Explain string class methods.
3. Explain the usage of ‘this’ keyword with example.
4. Explain about Typecasting with example.
5. Differentiate Abstract class Interface.
6. Explain Zipping and Unzipping files.
7. Define a thread. Write a program for creating a thread.
8. Explain the concept of JDBC.

Section - B

Answer the following questions

5X8 =40M

9. a) Explain primitive data types in java.
(OR)
b) Explain various operators in java with examples.
10. a) Define inheritance. What types of Inheritance? Write a program for multi-level inheritance
(OR)
b) Define constructor and its types. Explain parameterized constructor with an example.
11. a) Explain the concept of polymorphism. Write a program for method overloading
(OR)
b) What is an exception? Explain key words in exception handling.
12. a) Explain the concept of creating a file using File Writer with an example program.
(OR)
b) Explain the method in Thread Life Cycle with diagram.
13. a) Define Applet. Explain how to create an Applet.
(OR)
b) Explain the procedure to connect Oracle Database using jdbc-odbc driver.

SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL DEPARTMENT OF COMPUTER SCIENCE					
Course Code	Course 5: Operating Systems	Programme & Semester II B.Sc.Computer Science IV Semester			
Teaching	Hours Allocated: 60 (Theory and Activities) (6 Hrs/wk)	L	T	P	C
Pre-requisites	Basics programming knowledge	3	1	2	5

Course Objectives:

- The course aims to introduce students to the basics of operating systems, including their functions and features.
- The students will learn how operating systems work, the different types of operating systems, and the various components that make up an operating system.
- The course will cover the different models of OS design, including monolithic and microkernel architectures and how they are implemented.

Course Outcomes:

CO	Course Outcomes	Knowledge Level
CO1	Classify types of operating systems and understand operating system architectural design and its services	K3
CO2	Identify and compare various process management concepts including scheduling, threading	K4
CO3	Apply process scheduling techniques to efficiently run various applications	K3
CO4	Analyze the concept of memory management techniques	K3
CO5	Create various files in local host using file management concept and protect files using software	K6

CO-PO Mapping:

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

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IV Semester

Paper V: Operating Systems

Credits: 4

UNIT I:

Introduction to operating System, 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.

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-Pre-emptive and Pre-emptive Scheduling Algorithms.

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.

UNIT IV:

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

UNIT V:

File and I/O Management, OS Security: Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Security Policy Mechanism, Protection, Authentication and Internal Access Authorization

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN.

TEXT BOOKS:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and Greg Gagne (7th Edition) Wiley India Edition.
2. Operating Systems: Internals and Design Principles by Stallings (Pearson)

REFERENCES:

1. Operating Systems by J. Archer Harris (Author), Jyoti Singh (Author) (TMH)
2. Online Resources for UNIT V

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IV Semester

Paper V: Operating Systems Practicals

Time: 2 Hours

Max. Marks: 50

Details of Lab Syllabus: **Operating Systems Lab using C/Java**

1. Write a program to implement Round Robin CPU Scheduling algorithm
2. Simulate SJF CPU Scheduling algorithm
3. Write a program the FCFS CPU Scheduling algorithm
4. Write a program to Priority CPU Scheduling algorithm
5. Simulate Sequential file allocation strategies
6. Simulate Indexed file allocation strategies
7. Simulate Linked file allocation strategies
8. Simulate MVT and MFT memory management techniques
9. Simulate Single level directory File organization techniques
10. Simulate Two level File organization techniques
11. Simulate Hierarchical File organization techniques
12. Write a program for Bankers Algorithm for Dead Lock Avoidance
13. Implement Bankers Algorithm Dead Lock Prevention.
14. Simulate all Page replacement algorithms.
 - a) FIFO
 - b) LRU
 - c) LFU
15. Simulate Paging Techniques of memory management

Lab Evaluation Procedure

4. Record: 10 Marks

5. Procedure cum Execution: 30 Marks

6. Viva: 10 Marks

Total	<hr/> 50 Marks <hr/>
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IV Semester

Paper V: Operating Systems Model Paper

Time: 3Hours

Max.Marks:60

Section - A

Answer any5 question

5X4 =20M

1. Define operating system. Explain batch operating system.
2. What is process? Explain process state model.
3. Explain threading issues.
4. Define semaphore. Explain types of semaphore.
5. What are characteristics of deadlock? Explain briefly
6. Explain about Virtual memory.
7. Explain physical and logical address space.
8. Write about file types.

Section - B

Answer following question

5X8 =40M

9. a) Define operating system. Explain various types of operating systems.

(OR)

- b) What is operating system? Explain functions of operating system.

10. a) Define thread. Differentiate user level and kernel level threads.

(OR)

- b) Define preemption. What are various preemptive algorithms? Discuss briefly?

11. a) Define deadlock. What are necessary conditions for deadlock to occur?

(OR)

- b) Discuss classical process synchronization problems.

12. a) Explain the following

i) Segmentation

ii) Fixed and variable partitions.

(OR)

- b) Explain the concept of paging with example.

13. a) What are various file operations? Explain File allocation methods.

(OR)

- b) Explain concept of security policy mechanism.

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III Year V Semester

Paper V: Web Interface Designing Technologies

Credits: 3

UNIT I: (10 hours)

HTML: Introduction to web designing, difference between web applications and desktop applications, introduction to HTML, HTML structure, elements, attributes, headings, paragraphs, styles, colours, HTML formatting, Quotations, Comments, images, tables, lists, blocks and classes, HTML CSS, HTML frames, file paths, layout, symbols, HTML responsive.

UNIT II: (10 hours)

HTML forms: HTML form elements, input types, input attributes, HTML5, HTML graphics, HTML media – video, audio, plug INS, you tube.

HTML API'S: Geo location, Drag/drop, local storage, HTML SSE.

CSS: CSS home, introduction, syntax, colours, back ground, borders, margins, padding, height/width, text, fonts, icons, tables, lists, position, over flow, float, CSS combinators, pseudo class, pseudo elements, opacity, tool tips, image gallery, CSS forms, CSS counters, CSS responsive.

UNIT III: (10 hours)

Client side Validation: Introduction to JavaScript - What is DHTML, JavaScript, basics, variables, string manipulations, mathematical functions, statements, operators, arrays, functions. Objects in JavaScript - Data and objects in JavaScript, regular expressions, exception handling. DHTML with JavaScript - Data validation, opening a new window, messages and confirmations, the status bar, different frames, rollover buttons, moving images.

UNIT IV: (10 hours)

Word press: Introduction to word press, servers like wamp, bitnami e.tc, installing and configuring word press, understanding admin panel, working with posts and pages, using editor, text formatting with shortcuts, working with media-Adding, editing, deleting media elements, working with widgets, menus.

UNIT V: (10 hours)

Working with themes-parent and child themes, using featured images, configuring settings, user and user roles and profiles, adding external links, extending word press with plug-ins. Customizing the site, changing the appearance of site using css , protecting word press website from hackers.

REFERENCES

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).
3. Head First HTML and CSS, Elisabeth Robson, Eric Freeman, O'Reilly Media Inc.
4. An Introduction to HTML and JavaScript: for Scientists and Engineers, David R. Brooks. Springer, 2007
5. Schaum's Easy Outline HTML, David Mercer, Mcgraw Hill Professional.
6. Word press for Beginners, Dr.Andy Williams.
7. Professional word press, Brad Williams, David damstra, Hanstern.
8. Web resources:
 - a. <http://www.codecademy.com/tracks/web>
 - b. <http://www.w3schools.com>
 - c. <https://www.w3schools.in/wordpress-tutorial/>
 - d. <http://www.homeandlearn.co.uk>
9. Other web sources suggested by the teacher concerned and the college librarian including reading material.

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III Year V Semester

Paper V: Web Interface Designing Technologies lab

Web Interface Designing Technologies – PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Create a basic website with the help of HTML and CSS.
2. Acquire the skill of installing word press and various plugins of Word press.
3. Create a static website with the help of Word press.
4. Create an interface for a dynamic website.
5. Apply various themes for their websites using Word press.

Practical (Laboratory) Syllabus: (30 hrs.)

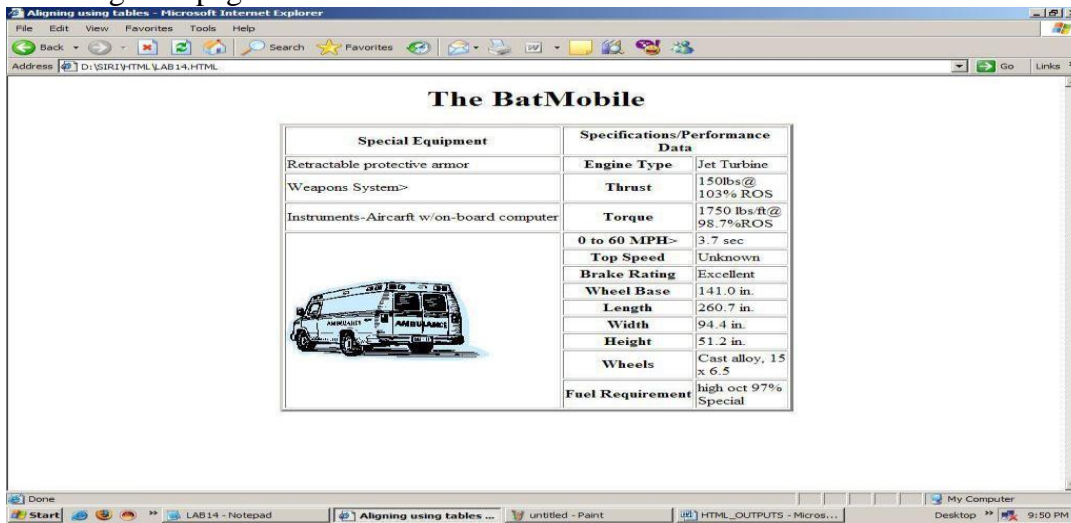
HTML and CSS:

1. Create an HTML document with the following formatting options:
(a) Bold, (b) Italics, (c) Underline, (d) Headings (Using H1 to H6 heading styles), (e) Font (Type, Size and Color), (f) Background (Colored background/Image in background), (g) Paragraph, (h) Line Break, (i) Horizontal Rule, (j) Pre tag
2. Create an HTML document which consists of:
(a) Ordered List (b) Unordered List (c) Nested List (d) Image
3. Create a Table with four rows and five columns. Place an image in one column.
4. Using “table” tag, align the images as follows:

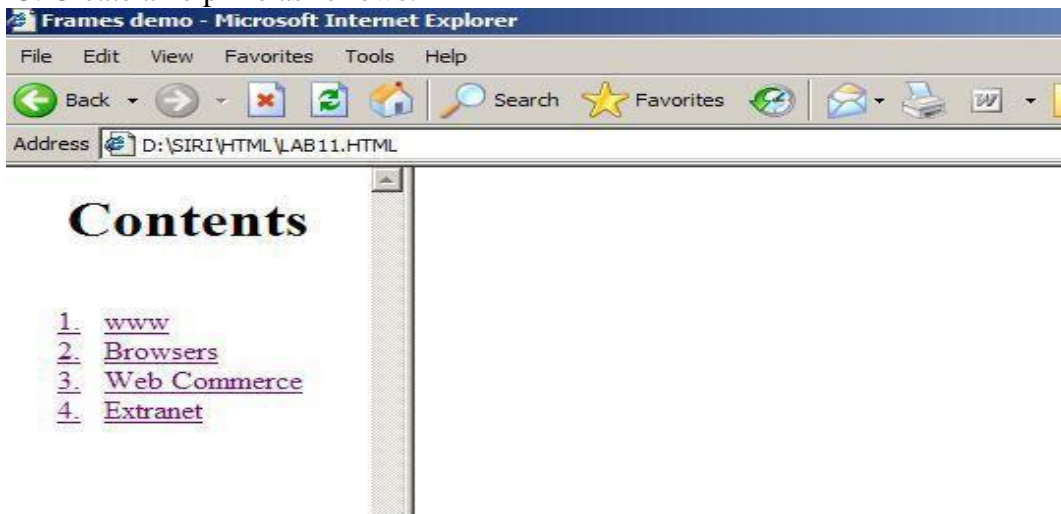


5. Create a menu form using html.
6. Style the menu buttons using css.
7. Create a form using HTML which has the following types of controls:
8. Embed a calendar object in your web page.
9. Create an applet that accepts two numbers and perform all the arithmetic operations on them.
10. Create nested table to store your curriculum.
11. Create a form that accepts the information from the subscriber of a mailing system.

12. Design the page as follows:



13. Create a help file as follows:



14. Create a webpage containing your bio data (assume the form and fields).

15. Write a html program including style sheets.

16. Write a html program to layers of information in web page.

17. Create a static webpage.

Word press:

1. Installation and configuration of word press.

2. Create a site and add a theme to it. 20 Create a child theme

3. Create five pages on COVID – 19 and link them to the home page. .

4. Create a simple post with featured image.

5. Add an external video link with size 640 X 360.

6. Create a user and assign a role to him.

7. Create a login page to word press using custom links

8. Create a website for your college.

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III Year V Semester

Paper V: Web Interface Designing Technologies

MODEL PAPER

Time: 3Hrs

Max.marks:75

Section - A

Answer any FIVE question 5X5 = 25M

1. Write the differences between web applications and desktop applications
2. Explain about table properties in HTML.
3. Write about HTML form elements.
4. Write the syntax for colours and borders in CSS.
5. Write the differences between HTML and DHTML.
6. Explain about Data and Objects in Java Script.
7. Write about wamp server.
8. Write about parent and child themes.

Section - B

Answer ALL following question 5X10 = 50M

9. a) Explain about different types of Lists in HTML with examples.
(or)
b) Explain HTML frames with example.
10. a) Explain about HTML media.
(or)
b) Explain about CSS counters and CSS responsive.
11. a) Explain about String manipulations in Java Script.
(or)
b) Explain about Data validation in Java Script with example.
12. a) Explain about installing and configuring word press.
(or)
b) Explain about media adding, editing, deleting media elements.
13. a) Explain about extending word press with plug-ins.
(or)
b) Explain about protecting word press website from hackers.

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III YEAR V SEMESTER

Course 7A: Web Applications Development using PHP & MySQL

UNIT I: (10 hours):

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: What is function?, Calling functions, Defining Functions, Returning the values from User-Defined Functions, Variable Scope, Saving state between Function calls with the static statement, more about arguments.

UNIT II: (10 hours):

Working with Arrays: What are Arrays? Creating Arrays, Some Array-Related Functions. Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP.

UNIT III: (10 hours):

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. 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.

UNIT IV: (10 hours):

Working with Files and Directories: Including Files with include(), Validating Files, Creating and Deleting Files, Opening a File for Writing, Reading or Appending, Reading from Files, Writing or Appending to a File, Working with Directories, Open Pipes to and from Process Using popen(), Running Commands with exec(), Running Commands with system() or passthru(). Working with Images: Understanding the Image-Creation Process, Necessary Modifications to PHP, Drawing a New Image, Getting Fancy with Pie Charts, Modifying Existing Images, Image Creation from User Input.

UNIT V: (10 hours):

Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data. Creating an Online Address Book: Planning and Creating Database Tables, Creating Menu, Creating Record Addition Mechanism, Viewing Records, Creating the Record Deletion Mechanism, Adding Sub-entities to a Record.

REFERENCES:

1. Julie C. Meloni, SAMS Teach yourself PHP MySQL and Apache, Pearson Education (2007).
2. Steven Holzner , PHP: The Complete Reference, McGraw-Hill
3. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition O'Reilly, 2014
4. XueBai Michael Ekedahl, The web warrior guide to Web Programming, Thomson (2006).
5. Web resources: e. <http://www.codecademy.com/tracks/php> f. <http://www.w3schools.com/PHP> g. <http://www.tutorialpoint.com>

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Course 7A: Web Application Development using PHP & MYSQL LAB

Practical (Laboratory) Syllabus: (30 hrs.)

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. Write a PHP program to generate the multiplication of two matrices.
7. Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
8. Create Website Registration Form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
9. Write PHP script to demonstrate passing variables with cookies.
10. Write a program to keep track of how many times a visitor has loaded the page.
11. Write a PHP application to add new Rows in a Table.
12. Write a PHP application to modify the Rows in a Table.
13. Write a PHP application to delete the Rows from a Table.
14. Write a PHP application to fetch the Rows in a Table.
15. Develop an PHP application to implement the following Operations
 - i. Registration of Users.
 - ii. Insert the details of the Users.
 - iii. Modify the Details.
 - iv. Transaction Maintenance.
 - a) No of times Logged in
 - b) Time Spent on each login.
 - c) Restrict the user for three trials only.
 - d) Delete the user if he spent more than 100 Hrs of transaction.
16. Write a PHP script to connect MySQL server from your website.
17. Write a program to read customer information like cust-no, cust-name, item- purchased, and mob-no, from customer table and display all these information in table format on output screen.
18. Write a program to edit name of customer to “Kiran” with cust-no =1, and to delete record with cust-no=3.
19. Write a program to read employee information like emp-no, emp-name, designation and salary from EMP table and display all this information using table format in your website.
20. Create a dynamic web site using PHP and MySQL

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III YEAR V SEMESTER- Model Paper

**Course 7A: Web Applications Development using PHP &
MYSQL**

Time: 3Hrs

Max.marks:75

Section - A

Answer any FIVE question

5X5 = 25M

1. Write about Data types in PHP.
2. Explain about variable Scope.
3. Write about Array related functions.
4. Explain about formatting strings with PHP.
5. Write about setting a Cookie with PHP.
6. Explain about validating files.
7. Write about image creation process.
8. Write about MySQL Versus MySQLi Functions.

Section - B

Answer ALL following question

5X10 = 50M

9. a) Explain about different Loops in PHP?

(or)

- b) Explain about user defined functions.

10. a) Explain about Object Instance working with Strings.

(or)

- b) Explain about Date and Time functions in PHP.

- 11 a) Explain about Sending Mail on Form Submission.

(or)

- b) Explain about Working with session variables and passing session IDs in the Query String.

- 12 a) Explain about reading from a file and appending to file.

(or)

- b) Explain how to modify existing images.

- 13 a) Explain about connecting to MySQL with PHP.

(or)

- b) Explain about Record Addition and Record Deletion mechanisms.

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III YEAR V SEMESTER

Paper 6B: Internet of Things

Learning Outcomes: Students after successful completion of the course will be able to:

1. Appreciate the technology for IoT
2. Understand various concepts, terminologies and architecture of IoT systems.
3. Understand various applications of IoT
4. Learn how to use various sensors and actuators for design of IoT.
5. Learn how to connect various things to Internet.
6. Learn the skills to develop simple IOT Devices.

UNIT I: (10 hours)

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

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

UNIT II: (10 hours)

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

UNIT III: (10 hours)

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet And Modbus. IP Based Protocols for IoT IPv6, 6LowPAN, LoRA, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocols.

UNIT IV: (10 hours)

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

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

UNIT V: (10 hours)

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.

REFERENCES:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-onApproach)”, 1st Edition, VPT, 2014
3. 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
4. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
5. Open source software / learning websites

- a. <https://github.com/connectIOT/iottoolkit>
- b. <https://www.arduino.cc/>
- c. https://onlinecourses.nptel.ac.in/noc17_cs22/course
- d. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html
- e. Contiki (Open source IoT operating system)
- f. Ardudroid (open source IoT project)
- g. <https://blynk.io> (Mobile app)
- h. IoT Toolkit (smart object API gateway service reference implementation)

6. Other web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher in field related skills: (lab: 10 + field: 05) :*

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying the case study for the IoT, design an IoT solution, build physical IoT device, connect it to a mobile app and deploy the IoT device.
2. **For Student:** Students shall (individually) search online and visit any of the places like aquaculture farms, agencies using IOT devices, etc to identify problems for IoT solution and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a Problem for IoT solution (agriculture, aquaculture, smart home appliances, testing moisture levels, oxygen levels, etc), reasons why IoT solution is feasible for the said problem, material required, Design and architecture for the proposed IoT device, method of implementation and how to connect the device to mobile.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of websites searched, place visited, observations, findings, proposed IOT problem, and design of the IOT device, implementation and acknowledgements.*
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments
3. Preparation and presentation of power-point slides, which include videos, animations, pictures, graphics, etc by the students.
4. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
5. Field visits to identify the problems for IoT solutions.

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Paper 6B: Internet of Things Lab

Internet of Things – PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Acquire the skills to design a small IoT device.
2. Connect various sensors, actuators, etc to Arduino board.
3. Connect the things to Internet
4. Design a small mobile app to control the sensors.
5. Deploy a simple IoT device.

Practical (Laboratory) Syllabus: (30 hrs)

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

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III YEAR V SEMESTER

Paper 6B:Internet of Things: Model Paper

Time: 3Hrs

Max.marks:75

Section - A

Answer any FIVE question

5X5 = 25M

1. What are the Definitions & Characteristics of IoT.
2. Write about IoT design Ethics.
3. Write about the Types of Sensors.
4. Write about RFID principles and components.
5. Write about Zigbee technology.
6. Explain about IPV6.
7. Write about Arduino Libraries.
8. Write about Fog Computing.

Section - B

Answer ALL following question

5X10 =

50M

9. a) Explain about Physical & Logical Design of IoT.
(or)
b) Explain about IoT in Environmental Protection.
10. a) Explain about Arduino IDE and Board Types.
(or)
b) Explain about Connecting nodes and Networking Nodes.
- 11 a) Explain about Bacnet and Modbus.
(or)
b) Explain about Edge connectivity and protocols.
- 12 a) Explain about Arduino Uno Architecture.
(or)
b) Explain about Interfacing of Actuators with Arduino.
- 13 a) Explain about Implementation of IoT with Arduino.
(or)
b) Explain about Privacy and Security Issues in IoT.

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III YEAR V SEMESTER

Paper 7B:Application Development Using Python

Learning Outcomes: Students after successful completion of the course will be able to:

1. Understand and appreciate the web architecture and services.
2. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
3. Demonstrate proficiency in handling Strings and File Systems.
4. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
5. Interpret the concepts of Object-Oriented Programming as used in Python.
6. Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.

Syllabus: *(Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)*

UNIT I: (10 hours)

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, Mapping and Set Types

UNIT II: (10 hours)

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, Persistent Storage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT III: (10 hours)

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT IV: (10 hours)

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

Web Programming: Introduction, Web Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application, Advanced CGI, Web (HTTP) Servers

UNIT V: (10 hours)

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

REFERENCES:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Think Python, Allen Downey, Green Tea Press.
3. Introduction to Python, Kenneth A. Lambert, Cengage.
4. Python Programming: A Modern Approach, VamsiKurama, Pearson.

5. Learning Python, Mark Lutz, O' Really.
6. Web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher in field related skills: (lab: 10 + field: 05)*)

1. **For Teacher:** Training of students by the teacher in laboratory/field for not less than 15 hours on field related skills like building an IOT device with the help of Python.
2. **For Student:** Students shall (individually) identify the method to link their IOT project done in Paper 7A with Python and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. It should include a brief report on the selected case study of IOT device, algorithm and Python program to operate the IOT device.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, design of the IOT device, implementation of Python program to connect the IOT device, findings and acknowledgements.*
5. Unit tests (IE).

b) 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 best websites.

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Paper 7B:Application Development Using Python Lab

Application Development Using Python– PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Implement simple programs in Python
2. Implement programs related to various data structures like lists, dictionaries, etc.
3. Implement programs related to files.
4. Implement applications related to databases, Web services and IOT.

Practical (Laboratory) Syllabus: (30 hrs.)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.

2. Write a python program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :

Grade A: Percentage ≥ 80

Grade B: Percentage ≥ 70 and < 80 Grade C: Percentage ≥ 60 and < 70

Grade D: Percentage ≥ 40 and < 60 Grade E: Percentage < 40

3. Write a python program to display the first n terms of Fibonacci series.

4. Write a python program to calculate the sum and product of two compatible matrices.

5. Write a function that takes a character and returns True if it is a vowel and False otherwise.

6. Write a menu-driven program to create mathematical 3D objects

I. curve

II. sphere

III. cone

IV. arrow

V. ring

VI. Cylinder.

7. Write a python program to read n integers and display them as a histogram.

8. Write a python program to display sine, cosine, polynomial and exponential curves.

9. Write a python program to plot a graph of people with pulse rate p vs. height h. The values of P and H are to be entered by the user.

10. Write a python program to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula $m=60/(t+2)$, where t is the time in hours. Sketch a graph for t vs. m, where $t \geq 0$.

11. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:
 $P(t) = (15000(1+t))/(15+e)$

12. Where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.

13. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:

VII. velocity wrt time ($v = u + at$)

VIII. distance wrt time ($s = ut + 0.5at^2$)

IX. distance wrt velocity ($s = (v^2 - u^2) / 2a$)

14. Write a program that takes two lists and returns True if they have at least one common member.

15. Write a Python program to print a specified list after removing the 0th, 2nd, 4th and 5th elements.

16. Write a program to implement exception handling.

17. Try to configure the widget with various options like: `bg="green"`, `family="times"`, `size=20`.

18. Write a Python program to read last 5 lines of a file.

19. Design a simple database application that stores the records and retrieve the same

20. Design a database application to search the specified record from the database.

21. Design a database application to that allows the user to add, delete and modify the records.

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III YEAR V SEMESTER - MODEL PAPER

Paper 7B: Application Development Using Python

Time: 3Hrs

Max.marks:75

Section - A

Answer any FIVE question

5X5 = 25M

1. Write about Python Objects.
2. Write about Numbers in Python.
3. Write about command-line arguments.
4. Explain how to Import Modules.
5. Write about Special Symbols and Characters.
6. Write about Related modules of GUIs.
7. Write about Web (HTTP) Servers.
8. Write about related modules of Database Programming.

Section - B

Answer ALL following question

5X10 = 50M

9. a) Explain about standard type operators.
(or)
b) Explain about Lists in detail.
10. a) Explain about Persistent Storage Modules
(or)
b) Explain about Detecting and Handling Exceptions.
- 11 a) Explain about Threads and the Global Interpreter Lock.
(or)
b) Explain about Thread Module and Threading Module.
- 12 a) Explain about Tkinter and Python Programming.
(or)
b) Explain about Building CGI Application.
- 13 a) Explain about Python Database Application Programmer's Interface (DBAPI).
(or)
b) Explain about Object Relational Managers (ORMs).

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III YEAR V SEMESTER

Paper 6C: Data science

Learning Outcomes: Students after successful completion of the course will be able to:

1. Develop relevant programming abilities.
2. Demonstrate proficiency with statistical analysis of data.
3. Develop the ability to build and assess data-based models.
4. Demonstrate skill in data management
5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

Syllabus: ((Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)

UNIT I: (10 hours)

Introduction: The Ascendance of Data, What is Data Science? , Finding key Connectors, Data Scientists You May Know, Salaries and Experience, Paid Accounts, Topics of Interest, Onward.

Python: Getting Python, The Zen of Python, Whitespace Formatting, Modules, Arithmetic, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries, Sets, Control Flow, Truthiness, Sorting, List Comprehensions, Generators and Iterators, Randomness, Object – Orienting Programming, Functional Tools, enumerate, zip and Argument Unpacking, args and kwargs, Welcome to Data Science!

Visualizing Data: matplotlib, Bar charts, Line charts, Scatterplots.

Linear Algebra: Vectors, Matrices

UNIT II: (10 hours)

Statistics: Describing a Single Set of Data, Correlation, Simpson’s Paradox, some Other Correlation Caveats, Correlation and Causation.

Probability: Dependence and Independence, Conditional Probability, Bayes’s Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem.

Hypothesis and Inference: Statistical Hypothesis Testing, Example: Flipping a Coin, Confidence Intervals, P-hacking, Example: Running an A/B Test, Bayesian Inference.

Gradient Descent: The Idea behind Gradient Descent, Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Putting It All Together, Stochastic Gradient Descent.

UNIT III: (10 hours)

Getting Data: stdin and stdout, Reading Files – The Basics of Text Files, Delimited Files, Scraping the Web - HTML and the parsing Thereof, Example: O’Reilly Books About Data, Using APIs – JSON (and XML), Using an Unauthenticated API, Finding APIs.

Working with Data: Exploring Your Data, Exploring One-Dimensional Data, Two Dimensions Many Dimensions, Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction.

Machine Learning: Modeling, What Is Machine Learning? Over fitting and under fitting, Correctness, The Bias-Variance Trade-off, Feature Extraction and Selection

UNIT IV: (10 hours)

K-Nearest Neighbors: The Model, Example: Favorite Languages, The Curse of Dimensionality.

Naive Bayes: A Really Dumb Spam Filter, A More Sophisticated Spam Filter, Implementation, Testing Our Model.

Simple Linear Regression: The Model, Using Gradient Descent, Maximum Likelihood Estimation.

Multiple Regression: The Model, Further Assumptions of the Least Squares Model, Fitting the Model, Interpreting the Model, Goodness of Fit.

UNIT V: (10 hours)

Logistic Regression: The Problem, The Logistic Function, Applying the Model, Goodness of Fit Support Vector Machines.

Decision Trees: What Is a Decision Tree? Entropy, The Entropy of a Partition, Creating a Decision Tree, Putting It All Together, Random Forests.

Neural Networks: Perceptron, Feed-Forward Neural Networks And Back propagation, Example: Defeating a CAPTCHA.

Clustering: The Idea, The Model, Example: Meetups , Choosing k, Example: Clustering Colors, Bottom-up Hierarchical Clustering.

REFERENCES:

1. Data Science from Scratch by Joel Grus O'Reilly Media

2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition, 2018.

3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.

4. Web resources:

a. <https://www.edx.org/course/analyzing-data-with-python>

b. [http://math.ecnu.edu.cn/~lfzhu/seminar/\[Joel_Grus\]_Data_Science_from_Scratch_First_Princ.pdf](http://math.ecnu.edu.cn/~lfzhu/seminar/[Joel_Grus]_Data_Science_from_Scratch_First_Princ.pdf)

5. 9. Other web sources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher in field related skills: (lab:10 + field: 05):*)

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying, analyzing and presenting the data and then to predict the future instances.

2. **For Student:** Students shall (individually) search online and visit any of the agencies like Statistical cell, weather forecasting centers, pollution control boards, manufacturing industries, agriculture departments, etc. to observe the manual process going on to collect the data, maintain the data, present the data and to predict the data for future instances and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of place visited, observations, findings and acknowledgements.*

5. Unit tests (IE).

b) 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 in related topics.

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Paper 6C: Data science Lab

Course 6C: Data Science – PRACTICAL SYLLABUS

Learning Outcomes: On successful completion of this practical course, student shall be able to:

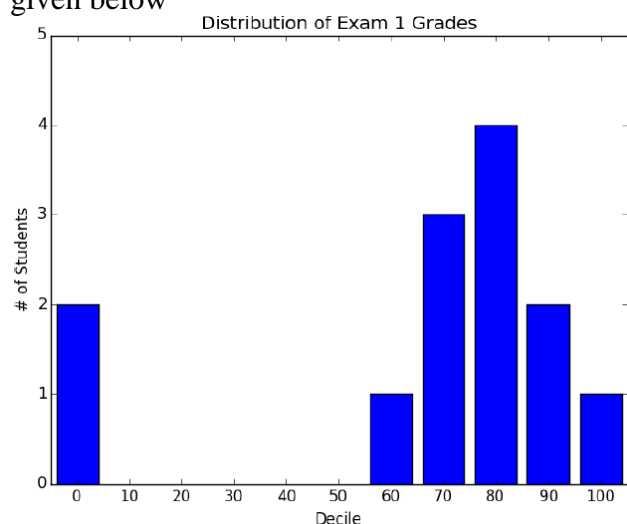
1. Apply data science solutions to real world problems.
2. Implement the programs to get the required data, process it and present the outputs using Python language.
3. Execute statistical analyses with Open source Python software.

Practical (Laboratory) Syllabus: (30 hrs.)

1. Write a Python program to create a line chart for values of year and GDP as given below



2. Write a Python program to create a bar chart to display number of students secured different grading as given below



3. Write a Python program to create a time series chart by taking one year month wise stock data in a CSV file
4. Write a Python program to plot distribution curve
5. Import a CSV file and perform various Statistical and Comparison operations on rows/columns. Write a python program to plot a graph of people with pulse rate p vs. height h. The values of P and H are to be entered by the user.
6. Import rainfall data of some location with the help of packages available in R Studio and plot a chart of your choice.

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III YEAR V SEMESTER – MODEL PAPER

Paper 6C: Data Science

Time: 3Hrs

Max.marks:75

Section - A

Answer any FIVE question

5X5 = 25M

1. Write about finding key Connectors.
2. Write about matplotlib.
3. Write about Simpson’s Paradox.
4. Explain about Bayes’s Theorem.
5. Write about The Basics of Text Files and Delimited Files.
6. Write about Rescaling, Dimensionality Reduction.
7. Write about Maximum Likelihood Estimation.
8. Write about Random Forests.

Section - B

Answer ALL following question

5X10 = 50M

9. a) Explain about Lists and Dictionaries.
(or)
b) Explain about Vectors and Matrices.
10. a) Explain about Correlation and Causation.
(or)
b) Explain about Statistical Hypothesis Testing.
- 11 a) Explain about Using an Unauthenticated API and finding APIs.
(or)
b) Explain about Feature Extraction and Selection.
- 12 a) Explain about Naive Bayes model.
(or)
b) Explain about Multiple Regression model.
- 13 a) Explain about Logistic Regression model.
(or)
b) Explain about Bottom-up Hierarchical Clustering.

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III YEAR V SEMESTER

Paper 7C: Python for Data science

Learning Outcomes: Students after successful completion of the course will be able to:

1. Identify the need for data science and solve basic problems using Python built-in data types and their methods.
2. Design an application with user-defined modules and packages using OOP concept
3. Employ efficient storage and data operations using NumPy arrays.
4. Apply powerful data manipulations using Pandas.
5. Do data pre-processing and visualization using Pandas

Syllabus: *(Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)*

UNIT I: (10 hours)

Introduction to Data Science - Why Python? - Essential Python libraries - Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion- Operators. Decision Making- Looping- Loop Control statement- Math and Random number functions. User defined functions - function arguments & its types.

UNIT II: (10 hours)

User defined Modules and Packages in Python- Files: File manipulations, File and Directory related methods - Python Exception Handling. OOPs Concepts -Class and Objects, Constructors – Data hiding- Data Abstraction- Inheritance.

UNIT III: (10 hours)

NumPy Basics: Arrays and Vectorized Computation- The NumPyndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes.

Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods-Sorting- Unique and Other Set Logic.

UNIT IV: (10 hours)

Introduction to pandas Data Structures: Series, Data Frame and Essential Functionality: Dropping Entries- Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking.

Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format

UNIT V: (10 hours)

Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas.

Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

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Paper 7C: Python for Data science Lab

Python for Data Science – PRACTICAL SYLLABUS

Learning Outcomes: On successful completion of this practical course, student shall be able to:

1. Implement simple programs in Python.
2. Implement programs related to various structures like arrays, lists, Data frames, etc.
3. Implement programs related to files.
4. Implement applications related to data science.

Practical (Laboratory) Syllabus: (30 hrs.)

1. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data types: Strings, List, Tuples, Dictionary, Set
2. Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem.
3. Handle numerical operations using math and random number functions
4. Create user-defined functions with different types of function arguments.
5. Create packages and import modules from packages.
6. Perform File manipulations- open, close, read, write, append and copy from one file to another.
7. Write a program for Handle Exceptions using Python Built-in Exceptions
8. Write a program to implement OOP concepts like Data hiding and Data Abstraction.
9. Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.
10. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.
11. Computation on NumPy arrays using Universal Functions and Mathematical methods.
12. Load an image file and do crop and flip operation using NumPy Indexing.
13. Create Pandas Series and Data Frame from various inputs.
14. 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 columns.
 - (f) Find the count and uniqueness of the given categorical values.
 - (g) Rename single/multiple columns

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III YEAR V SEMESTER – MODEL PAPER

Paper 7C: Python for Data Science

Time: 3Hrs

Max.marks:75

Section - A

Answer any FIVE question

5X5 = 25M

1. Write about essential Python libraries.
2. Write about Indentation and Comments in Python.
3. Write about File manipulations
4. Explain about Data Abstraction.
5. Write about Data Types for ndarrays.
6. Write about Element-Wise Array Functions.
7. Write about Dropping Entries.
8. Write about Handling Missing Data.

Section - B

Answer ALL following question

5X10 = 50M

9. a) Explain about Loop Control statement
(or)
b) Explain about function arguments & its types.
10. a) Explain about Python Exception Handling.
(or)
b) Explain about Inheritance in Python.
- 11 a) Explain about Transposing Arrays and Swapping Axes.
(or)
b) Explain about Mathematical and Statistical Methods
- 12 a) Explain about Sorting and Ranking.
(or)
b) Explain about Reading and Writing Data in Text Format.
- 13 a) Explain about Detecting and Filtering Outliers.
(or)
b) Explain about Histograms and Density Plots.

B.Sc(Data Science)

COURSE OUTCOMES:

S.No.	Course Name	Course Outcomes
1	Data Analytics With Tableau	<p>CO-1. Produce, comprehend, and run Tableau Prep flows to clean and prepare datasets. This includes creating and running flows with dedicated steps to address cleaning, reformatting, grouping, aggregating, and outputting datasets, with different formats.</p> <p>CO-2. Apply and comprehend commonly used data analytics techniques with Tableau Desktop. Understand multiple data analytics techniques' advantages, disadvantages, and utility through several assignments and a final project.</p> <p>CO-3. Produce effective data visualizations that allow from data exploration to data storytelling.</p> <p>CO-4. Develop analytics that yield insights for different stakeholders through Tableau sheets, data stories, and dashboards.</p> <p>CO-5. Develop a professional Tableau profile online to showcase your work done in this class.</p>
2	AI Concepts and Techniques with Python	<p>CO-1. Understand the informed and uninformed problem types and apply search strategies to solve them.</p> <p>CO-2. Apply difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.</p> <p>CO-3. Design and evaluate intelligent expert models for perception and prediction from intelligent environment.</p> <p>CO-4. Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques</p> <p>CO-5. Demonstrate and enrich knowledge to select and apply AI tools to synthesize information and develop models within constraints of application area.</p>
3	Supervised ML with Python	<p>CO-1. Understand the features of machine learning to apply on real world problems.</p> <p>CO-2. Characterize the machine learning algorithms as supervised learning and unsupervised learning and Apply and analyze the various algorithms of supervised and unsupervised learning.</p> <p>CO-3. Analyze the concept of neural networks for learning linear and non-linear activation functions</p> <p>CO-4. Learn the concepts in Bayesian analysis from probability models and methods</p> <p>CO-5. Understand the fundamental concepts of Genetic Algorithm and Analyze and design the genetic algorithms for optimization engineering problems</p>

4	Unsupervised ML with Python	<p>CO-1. Understand how to evaluate clustering results using a variety of metrics.</p> <p>CO-2. Understand the use of topic modeling (Latent Dirichlet Allocation and Non-Negative Matrix Factorization forms) and best practices for its application.</p> <p>CO-3. Understand how unsupervised learning can be used to improve supervised prediction.</p> <p>CO-4. Perform density estimation using a kernel, with a single random variable.</p> <p>CO-5. Interpret a biplot result from principal components analysis (PCA).</p>
5	NLP with Python	<p>CO-1. Understand the concepts of linguistic foundations that underlie natural language processing, which would provide the knowledge for building components of NLP systems.</p> <p>CO-2. Discover the capabilities, analyze them and explore the limitations of current natural language technologies, and some of the algorithms and techniques that underline these technologies to take up various research challenges in the field</p> <p>CO-3. Apply the computational knowledge for Natural Language Processing to understand the properties of natural languages, its algorithms for processing linguistic information in various tasks .</p> <p>CO-4. Demonstrate the concepts of morphology, syntactic analysis, semantic interpretation and pragmatics of the language, and understanding them to apply in different research areas.</p> <p>CO-5. Recognize the significance of research in natural language processing for common NLP tasks such as text classification, spam filtering, spell checking, machine learning, etc. to engage in lifelong learning.</p>
6	Deep Learning Neural Networks With Python	<p>CO-1. Able to understand the mathematics behind functioning of artificial neural networks</p> <p>CO-2. Able to analyze the given dataset for designing a neural network based solution</p> <p>CO-3. Able to carry out design and implementation of deep learning models for signal/image processing applications</p> <p>CO-4. Able to design and deploy simple Tensor Flow-based deep learning solutions to classification problems</p> <p>CO-5. Enable design and deployment of deep learning models for machine learning problems</p>

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-6A: Data Analytics with Tableau

UNIT I:

Introduction to Data Analytics: Big Data and Data Science, Big Data Architectures, A Short Taxonomy of Data Analytics, Examples of Data Use, History on Methodologies for Data Analytics. Descriptive Statistics: Scale Types, Descriptive Univariate Analysis, Descriptive Bivariate Analysis.

UNIT II:

Descriptive Multivariate Analysis: Multivariate Frequencies, Multivariate Data Visualization, Multivariate Statistics, Infographics and Word Clouds Data Quality and Preprocessing: Data Quality, converting to a Different Scale Type, Converting to a Different Scale, Data Transformation, and Dimensionality Reduction.

UNIT III:

Clustering: Distance Measures, Clustering Validation, Clustering Techniques.
Frequent Pattern Mining: Frequent Item sets, Association Rules, Behind Support and Confidence, Other Types of Pattern.

UNIT IV:

Regression: Predictive Performance Estimation, Finding the Parameters of the Model, Technique and Model Selection.
Classification: Binary Classification, Predictive Performance Measures for Classification, Distance-based Learning Algorithms, Probabilistic Classification Algorithms.

UNIT V:

Additional Predictive Methods: Search-based Algorithms, Optimization-based Algorithms.
Advanced Predictive Topics: Ensemble Learning, Algorithm Bias, Non-binary Classification Tasks, Advanced Data Preparation Techniques for Prediction.

TEXT BOOKS:

1. “A General Introduction to Data Analytics” by João Mendes Moreira, André C. P. L. F. de Carvalho, TomášHorváth, 2019 Edition, Wiley Publications.
2. “Data Analytics: Principles, Tools and Practices” by Dr. Gaurav Aroraa, ChitraLele, Dr. Munish Jindal, 2022 Edition, pbp publications
3. “Data Analytics” by Anil Maheshwari, First Edition, McGraw Hill Education

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-VIA: Data Analytics with Tableau LAB

LIST OF EXPERIMENTS:

Hadoop

1. Install, configure and run Hadoop and HDFS
2. Implement word count / frequency programs using MapReduce
3. Implement an MR program that processes a weather dataset

R

1. Implement Linear and logistic Regression
2. Implement SVM / Decision tree classification techniques
3. Implement clustering techniques
4. Visualize data using any plotting framework
5. Implement an application that stores big data in Hbase / MongoDB / Pig using Hadoop / R.

TEXT BOOKS:

1. “A General Introduction to Data Analytics” by João Mendes Moreira, André C. P. L. F. de Carvalho, TomášHorváth, 2019 Edition, Wiley Publications.
2. “Data Analytics: Principles, Tools and Practices” by Dr. Gaurav Aroraa, ChitraLele, Dr. Munish Jindal, 2022 Edition, pbp publications.
3. “Data Analytics” by Anil Maheshwari, First Edition, McGraw Hill Education

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-VIA: Data Analytics with Tableau – Model Paper

Time:3Hrs

Max.Marks:75

SECTION – A

Answer any FIVE of the following.

5x5=25M

1. Write about natural taxonomy that exists in data analytics.
2. What are the multivariate frequencies?
3. Write about Clustering Validation.
4. Explain about simple linear regression model.
5. Write about Random Forests.
6. Write about Two Quantitative Attributes with an example.
7. Write about missing values in the data set.
8. Explain about Eclat

SECTION-B

Answers ALL the following Questions.

5X10=50M

9. a) Explain about The CRISP-DM Methodology.

(OR)

- b) Explain about Univariate Data Visualization.
10. a) Explain about Multivariate Data Visualization.

(OR)

- b) Explain about Converting data in a scale to another scale of the same type.
11. a) Finite about Distance Measures for Non-conventional Attributes.

(OR)

- b) Explain about Apriori – a Join-based Method.
12. a) Explain about Predictive Performance Measures for Regression.

(OR)

- b) Explain about binary classification.
13. a) Explain about back propagation in MLP.

(OR)

- b) Explain about Algorithm Bias.

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-7A: AI Concepts and Techniques with Python

UNIT I:

Problems and Search: What is Artificial Intelligence, The AI Problems, and Underlying Assumption, what is an AI Technique.

Problems, Problems Spaces, and Search: Defining the problem as a state space search, production systems, problems characteristics, issues in the design of search programs.

UNIT II:

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

UNIT III:

Knowledge Representation Issues: Representations and Mapping, Approaches to Knowledge Representation, The frame problem. Using Predicate Logic: Representing simple facts in logic, Representing Is-a relationships, predicates, Resolution

UNIT IV:

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

UNIT V:

Symbolic Reasoning under Uncertainty: Introduction to Non-monotonic Reasoning, Logics for Non-monotonic Reasoning, Implementation issues, Augmenting a Problem solver, implementation: DFS, BFS. Statistical Reasoning: Probability and Bayes Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory.

TEXT BOOK:

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

REFERENCES BOOK:

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

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-7A:AI Concepts and Techniques with Python LAB

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python.
3. Write a Program to Implement Tic-Tac-Toe game using Python.
4. Write a Program to implement 8-Puzzle problem using Python.
5. Write a Program to Implement Water-Jug problem using Python.
6. Write a Program to Implement Travelling Salesman problem using Python.
7. Write a Program to Implement Towers of Hanoi problem using Python.
8. Write a Program to implement 8-Queens problem using Python.

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-VII A: AI Concepts and Techniques with Python – Model Paper

Time: 3Hrs

Max.Marks:75

SECTION-A

Answer any FIVE of the following

5x5=25M

1. What is AI Technique?
2. Define State space search
3. Explain Generate and test
4. What is heuristic search technique?
5. What is resolution?
6. Explain Uncertainty implementation issues
7. Explain Bayes Theorem
8. Define Dempster-Shafer Theory.

SECTION-B

Answers ALL the Following Questions.

5X10=50M

9. a) Define Artificial Intelligence. Applications and characteristics of AI.

(OR)

- b) Explain the state space representation of Water – Jug problem.

10. a) Define Heuristic search? What are the advantages of Heuristic search?

(OR)

- b) Describe the Hill climbing.

11. a) What is predicate logic? Explain the predicate logic representation with reference to suitable example.

(OR)

- b) Describe the approaches to Knowledge Representation and explain the Issues in Knowledge Representation

12. a) Explain Procedural Vs Declarative knowledge

(OR)

- b) Explain the Issues in Knowledge Representation. Write notes on control knowledge.

13. a) Show how to implement Non-monotonic reasoning using JTMS in medical diagnosis. Consider rules such as “If you have a runny nose, assume you have a cold unless it is Allergy season.”

(OR)

- b) Explain logics for Non-monotonic reasoning and discuss the implementation issues.

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III YEAR V SEMESTER

(Skill Enhancement Course- Elective)

Paper-6B: Supervised Learning with Python

UNIT I:

Machine Learning Basics: What is machine learning? Key terminology, Key tasks of machine learning, How to choose right algorithm, steps in developing a machine learning, why python? Getting started with Numpy library

Classifying with k-Nearest Neighbors: The k-Nearest Neighbors classification algorithm, Parsing and importing data from a text file, Creating scatter plots with Matplotlib, Normalizing numeric values

UNIT II:

Splitting datasets one feature at a time-Decision trees: Introducing decision trees, measuring consistency in a dataset, using recursion to construct a decision tree, plotting trees in Matplotlib

UNIT III:

Classifying with probability theory-Naïve Bayes: Using probability distributions for classification, learning the naïve Bayes classifier, Parsing data from RSS feeds, using naïve Bayes to reveal regional attitudes

UNIT IV:

Logistic regression: Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients, the gradient descent optimization algorithm, Dealing with missing values in the our data

UNIT V:

Support vector machines: Introducing support vector machines, using the SMO algorithm for optimization, using kernels to “transform” data, Comparing support vector machines with other classifiers.

TEXT BOOK:

1. Machine learning in action, Peter Harrington by Manning publications

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-6B: AI Supervised Learning with Python LAB

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm.
4. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a CSV file.
5. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
6. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
7. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
8. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

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III YEAR V SEMESTER

(Skill Enhancement Course- Elective)

Paper-6B: Supervised Learning with Python – Model Paper

Time: 3Hrs

Max.Marks:75

SECTION-A

Answer any FIVE of the following

5x5=25M

1. What is Machine Learning? Discuss its key terminology.
2. How to normalize numeric values.
3. What is Decision tree? Explain.
4. Discuss how to reveal regional attributes.
5. Explain Logistic Regression
6. Define Support Vector Machine.
7. How to deal with missing values.
8. List some of the Numpy library functions.

SECTION-B

Answer ALL the following Questions.

5X10=50M

9. A) Discuss the steps in developing Machine Learning.

(OR)

B) Discuss k-Nearest Neighbours classification algorithm.

10. A) How to construct a decision tree.

(OR)

B) What are the steps for plotting trees in Matplotlib..

11. A) What is Classification ? Discuss naïve Bayes classifier.

(OR)

B) What is Parsing? How to Parse data from RSS feeds.

12. A) Discuss classification with logistic regression and the sigmoid function.

(OR)

B) Discuss gradient descent optimization algorithm.

13. A) Comparing support vector machines with other classifiers.

(OR)

B) Discuss SMO algorithm for optimization.

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-7B: Unsupervised ML Learning with Python

UNIT I:

Unsupervised Learning: Clustering: k-means clustering algorithm, Improving cluster performance with post processing, Bisecting k-means, Example: clustering points on a map

UNIT II:

Association analysis : Apriori algorithm: Association analysis, The Apriori principle, Finding frequent item sets with the Apriori algorithm, Mining association rules from frequent item sets, uncovering patterns in congressional voting

UNIT III:

Finding frequent item sets: FP-growth –FP trees, Build FP-tree, mining frequent from an FP-tree, finding co-occurring words in a Twitter feed, mining a click stream from a news site.

UNIT IV:

Principal component analysis: Dimensionality reduction techniques, using PCA to reduce the dimensionality of semiconductor manufacturing data

UNIT V:

Singular value decomposition: Applications of the SVD, Matrix factorization, SVD in Python, Collaborative filtering–based recommendation engines, a restaurant dish recommendation engine

TEXT BOOK:

1. Machine learning in action, Peter Harrington by Manning publications

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-7B: Unsupervised ML Learning with Python LAB

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. Implementation of K-Means Clustering
2. Implement the bisecting k-means clustering algorithm
3. Implement Apriori algorithm
4. Implement Association rule-generation functions
5. Implement FP-tree creation
6. Write a function to find all paths ending with a given item.
7. Implement Code to access the Twitter Python library
8. Implement the PCA algorithm
9. Write a program to find Rating estimation by using the SVD
10. Implement Image-compression functions using SVD

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III YEAR V SEMESTER

(Skill Enhancement Course- Elective)

Paper-VII B: Unsupervised ML Learning with Python – Model Paper

Time: 3Hrs

Max.Marks:75

SECTION-A

Answer any FIVE of the following

5x5=25M

1. What is Unsupervised Learning?
2. Define Clustering.
3. What is Associative analysis?
4. How to mine a click stream from a news site.
5. Explain mining frequent from an FP-tree
6. What are Dimensionality reduction techniques?
7. List Applications of the SVD.
8. Explain Matrix factorization.

SECTION – B

Answer ALL the Following Questions.

5 X 10 = 50M

9. a) Discuss k-means clustering algorithm.
(OR)
b) How to improve cluster performance with post processing.
10. a) Explain Apriori algorithm along with its principles.
(OR)
b) Discuss Mining association rules from frequent item sets.
11. a) Define Finding frequent item sets: FP-growth –FP trees, Build FP-tree
(OR)
b) List out steps to find co-occurring words in a Twitter feed
12. a) Discuss Principal component analysis to reduce dimensionality.
(OR)
b) How PCA is used to reduce the dimensionality of semiconductor manufacturing data
13. a) Discuss how Singular value decomposition(SVD) is implemented in Python.
(OR)
b) Discuss Collaborative filtering–based recommendation engines.

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-VI C: NLP with Python

UNIT I:

Natural Language Processing: What is NLP? NLP and linguistics -Syntax and semantics, Pragmatics and context, two views of NLP, Tasks and super tasks. Linguistic tools- Sentence delimiters and tokenizers, Stemmers and taggers, Noun phrase and name recognizers, Parsers and grammars.

UNIT II:

Document Retrieval: Information retrieval, Indexing technology Query processing: Boolean search, Ranked retrieval, Probabilistic retrieval, Language modeling Evaluating search engines: Evaluation studies Evaluation Metrics Relevance Judgments Total system evaluation
Attempts to enhance search performance: Table of contents Query expansion and thesauri, Query expansion from relevance information

UNIT III:

Information extraction: The Message Understanding Conferences, Regular expressions Finite automata in FASTUS: Finite State Machines and regular languages, Finite State Machines as parsers Pushdown automata and context-free grammars: Analyzing case reports
Context free grammars parsing with a pushdown automaton, coping with incompleteness and ambiguity

UNIT IV:

Text categorization: Overview of categorization tasks and methods , Handcrafted rule based methods Inductive learning for text classification : Naïve Bayes classifiers , Linear classifiers, Decision trees and decision lists Nearest Neighbor algorithms Combining classifiers : Data fusion, Boosting, Using multiple classifiers

UNIT V:

Text mining: What is text mining? Reference and coreference, Named entity recognition, The co-reference task, Automatic summarization: Summarization tasks, constructing summaries from document fragments, Multi-document summarization (MDS) testing of automatic summarization programs: Evaluation problems in summarization research, Building a corpus for training and testing.

TEXT BOOK:

1. Natural Language Processing for Online Applications, Text Retrieval Extraction & Categorization. Peter Jackson, Isabelle Moulinier, Thomson Legal & Regulatory.

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-7C : NLP with Python LAB

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. INSTALLATION
2. WORD TOKENIZER
3. SENTENCE TOKENIZER
4. PARAGRAPH TOKENIZER
5. PROBABILISTIC PARSING
6. PROBABILISTIC CONTEXT FREE GRAMMER
7. LEARNING GRAMMAR
8. CONDITIONAL FREQUENCY DISTRIBUTIONS
9. LEXICAL ANALYSER
10. WORDNET
11. CONTEXT FREE GRAMMAR
12. LARGE CONTEXT FREE GRAMMAR AND PARSING
13. NAMED ENTITY RECOGNITION

TEXT BOOK:

1. Natural Language with Python, Steven Bird and O'Reilly , First Edition.

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III YEAR V SEMESTER

(Skill Enhancement Course- Elective)

Paper-6C: NLP with Python – Model Paper

Time: 3Hrs

Max.Marks:75

SECTION – A

Answer any FIVE of the following Questions.

5 X 5 = 25M

1. What is NLP? Explain its syntax and semantics.
2. Discuss two views of NLP.
3. Explain how information is retrieved.
4. Discuss Finite State Machines
5. Discuss Parsing with Pushdown Automata.
6. What are Handcrafted rule based methods.
7. What is Text mining? Explain.
8. Discuss Multi-document summarization (MDS).

SECTION – B

Answer ALL the Following Questions.

5 X 10 = 50M

9. a) Discuss Linguistic tools in detail.

(OR)

- b) What are the existing Parsers and grammars in NLP? Explain.
10. a) Explain methods in Indexing Technology Query processing.

(OR)

- b) Discuss in detail about Language modeling Evaluating search engines.
11. a) Finite State Machines as parsers Pushdown automata Discuss.

(OR)

- b) What is Parsing? Explain Context free grammars Parsing with a pushdown automaton.
12. a) Discuss Text categorization tasks and methods.

(OR)

- b) What is Naive Bayes algorithm? When we can use this algorithm in NLP?
13. a) Discuss the tasks involved in Automatic summarization.

(OR)

- b) How Testing of automatic summarization programs done explain.

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III YEAR V SEMESTER
(Skill Enhancement Course- Elective)
Paper-7C:Deep Learning Neural Networks with Python

UNIT I:

Introduction to Deep Learning: Artificial intelligence, machine learning and deep learning, history of machine learning, why deep learning? Why now?

The mathematical building blocks of neural networks: A first look at a neural network, Data representations for neural networks, The gears of neural networks: tensor operations, The engine of neural networks: gradient-based optimization.

UNIT II:

Getting started with neural networks: Anatomy of a neural network, Introduction to Keras, Setting up a deep-learning workstation, Classifying movie reviews: a binary classification

Example, Classifying newswires: a multiclass classification example, Predicting house prices: a regression example.

Fundamentals of machine learning: Four branches of machine learning, evaluating machine-learning models, Data preprocessing, feature engineering and feature learning, Overfitting and underfitting, the universal workflow of machine learning.

UNIT III:

Deep learning for computer vision: Introduction to convnets, Training a convnet from scratch on a small dataset, using a pretrained convent, visualizing what convnets learn.

UNIT IV:

Deep learning for text and sequences: Working with text data, Understanding recurrent neural networks, advanced use of recurrent neural networks, Sequence processing with convnets.

UNIT V:

Advanced deep-learning best practices: Going beyond the Sequential model: the Keras functional API, Inspecting and monitoring deep-learning models using Keras callbacks and Tensor Board, Getting the most out of your models.

TEXT BOOKS:

1. “Deep Learning with Python” by Francois Chollet, , 2018 Edition, Manning Publications.
2. “Deep Learning with Python” by Nikhil Ketkar, JojoMoolayil, Second Edition, Apress.
3. “Python Deep Learning” by Ivan Vasilev, Daniel Slatter, Second Edition, Packt Publications.

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III YEAR V SEMESTER

(Skill Enhancement Course- Elective)

Paper-7C:Deep Learning Neural Networks with Python Lab

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. How to train a network using Keras in Python
2. Write programs to demonstrate Tensor Operations
3. Classifying movie reviews: a binary classification example
4. Predicting house prices: a regression example
5. Demonstrate Convnets by the following tasks
 - i. Instantiating a Convnet
 - ii. Adding classifier on top of the Convnet
 - iii. Training the Convnet on MNIST images
6. Display curves of loss and accuracy during training
7. Word level one-hot encoding (Toy example)
8. Character level one-hot encoding (Toy example)
9. Using Keras for Word level one-hot encoding
10. Word level one-hot encoding with hashing trick

TEXT BOOKS:

1. “Deep Learning with Python” by Francois Chollet, , 2018 Edition, Manning Publications.

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III YEAR V SEMESTER

(Skill Enhancement Course- Elective)

Paper-7C:Deep Learning Neural Networks with Python – Model Paper

Time: 3Hrs

Max.Marks:75

SECTION – A

Answer any FIVE of the following Questions.

5 X 5 = 25M

1. What is Machine Learning?
2. Write about the relationship between network, layers, loss function and optimizer.
3. Explain max pooling operation.
4. Explain about word-level one-hot encoding with example.
5. Write about multi input model.
6. What are the tensor operations?
7. Write about feature engineering for reading the time on a clock.
8. Write how a bidirectional RNN works.

SECTION – B

Answer ALL the Following Questions.

5 X 10 = 50M

9. a) Explain how deep learning works in three figures.
(OR)
b) Explain about Data representations for neural networks.
10. a) Explain about binary classification example.
(OR)
b) Explain about Four branches of machine learning
11. a)Finite about Data preprocessing.
(OR)
b)Explain how to plot the results with an example.
12. a) Explain about LSTM and GRU layers.
(OR)
b) Explain about Combining CNNs and RNNs to process long sequences.
13. a) Explain about Directed acyclic graphs of layer
(OR)
b) Explain about Tensor Flow visualization framework.

Certificate Course

on

“Introduction to Python programming”

Course objectives:

- The course is designed to provide Basic knowledge of Python.
- To acquire programming skills in core Python.
- Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.

Course outcomes of specific programme:

At the end of the course, the student will be able to

- Understand basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions.
- Explain basic principles of Python programming language.
- Problem solving and programming capability.

Syllabus:

Module 1 - Python, Anaconda and relevant packages installations, Features of Python, Comparison with C, keywords and identifiers, comments, indentation and statements, variables and data types in python, standard input and output, operators.

Module 2 - Decision and Control flow Statements: if else, while loop, for loop, break and continue statements.

Module 3 - Data Structures: Lists-accessing and updating values in list, Tuples, Sets, Dictionary, Strings.

Module 4- Functions: Introduction, types of functions, Function arguments, Recursive functions, Lambda functions,

Module 5- Arrays and Numpy package-Creation, Importing, Processing Arrays, Types of Arrays, Arrays using numpy, Operations on Arrays, multi-dimensional arrays, matrices in numpy, example programs,