

DHANRAJ BAID JAIN COLLEGE (Autonomous)

Co-Educational Minority Institution
Owned & Managed by Tamil Nadu Educational and Medical Trust
Approved by Government of Tamil Nadu & Affiliated to University of Madras
Re-Accredited by NAAC with "B+" Grade
Thoraipakkam, Chennai – 600 097.

DEPARTMENT OF COMPUTER SCIENCE B.C.A. (Computer Application)



SYLLABUS
(Choice Based Credit System)
(Effective from the academic year 2023-2024)
As per TANSICHE

Total No. of Semesters: **6**

Total No. of Credits: **140**

SCIENCE PROGRAM OUTCOMES

- PO1. Science:** Apply the knowledge of science fundamentals to solve problems in chosen field.
- PO2. Problem Analysis:** Identify and review literature, thereby analyzing problems to arrive at substantiated solutions using the basic principles of science.
- PO3. Science Graduate and Society:** Apply reasoning to assess the societal issues like health, safety, legal and cultural to dominate the need for sustainable development.
- PO4. Ethics:** Apply ethical principles and commit to the professional ethics and norms.
- PO5.Environment and Sustainability:** To understand the impact of responsibility of pursuing the environment and demonstrate the need for sustainable development.
- PO6. Individual and Team Work:** Function effectively as an individual and as member or leader in diverse teams in multi – disciplinary settings.
- PO7. Communication:** Speak, read , write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- PO8. Project Management and Finance:** Demonstrate the knowledge of the understanding of the fundamental principle of managing a project and apply the same in one’s own work as a member and as a leader of a team, to manage project in a multi-disciplinary environment.
- PO9. Life – Long Learning:** Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOME

- PSO1.** Learning the applications of various software elements which help to identify various analysis and design methodologies.
- PSO2.** Demonstrate by developing computer programs in the area related to algorithm, web designing, facilitating efficient design for complex problems.
- PSO3.** Enables the students to be familiar with the modern- day issues, latest trends in computing and technology and create ideas and solutions to existing problems.

B.C.A. -Bachelor of Computer Application
SEMESTER SYSTEM WITH CREDITS
(Effective from the academic year 2023-2024)

REGULATIONS

1. ELIGIBILITY FOR ADMISSION

Candidates for admission to the first year of the Degree of Bachelor of Computer Application (B.C.A) Courses shall be required to have passed the Higher Secondary Examinations, having Mathematics/ Commerce/ Computer Science as one of the subject, conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereof by the Syndicate of the University of Madras.

2. ELIGIBILITY FOR THE AWARD OF DEGREE

A Candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in our College which is affiliated to the University of Madras for a period of not less than three academic years, passed the examinations of all the Six Semesters prescribed earning 140 credits and fulfilled such conditions as have been prescribed therefor.

3. DURATION

- a) Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third and fourth semesters and the third academic year the fifth and sixth semesters respectively.
- b) The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. COURSE OF STUDY

The Main Subject of study for Bachelor Degree shall consist of the following

1. FOUNDATION COURSES: The course shall comprise the study of:

- a) PART-I Tamil or any other Modern (Indian or Foreign) or Classical Languages; and
- b) PART-II English

2. PART –III consist of CORE COURSES , Electives and Practical's.

3 PART –IV Consist of Skill Enhancement Course (SEC/NME), Foundation Course(FC) , Environmental Studies (EVS), Value Education(VE), Summer Internship (SI) and Professional Competency Skill.

.4. Compulsory Extension Activity.

5. COMPULSORY EXTENSION SERVICE:

A candidate shall be awarded a maximum of 2 credits for Compulsory Extension Service.

All the students shall have to enroll for NSS/NCC/NSO (Sports & Games) Retract / Youth Red Cross or any other service organizations in the College and shall have to put in compulsory minimum attendance of 40 hours

which shall be duly certified by the Principal of the College before 31st March in a year. If a student LACKS 40 HOURS ATTENDANCE in the first year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum attendance of 40 hours in One year will get ONE CREDIT and those who complete the attendance of 80 or more hours in Two years will get 2 CREDITS.

Literacy and population Education Field Work shall be compulsory components in the above extension service activities.

6. SCHEME OF EXAMINATION

Scheme of Examination shall be enclosed in APPENDIX - I

7. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

- I. Candidates shall register their names for the First Semester Examination after the admission in the UG Courses.
- II. Candidates shall be permitted to proceed from the First Semester up to final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (subsequent) Semester Subjects.
- III. Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed therefore by the syndicate from time to time, provided in case of a candidate earning less than 50% of attendance in any one of the Semesters due to any extraordinary circumstance such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the Course of Study. Such candidates shall have to repeat the missed semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the University from time to time.

8. PASSING MINIMUM

A candidate shall be declared to have passed in each paper/practical of the Main Subject of study wherever prescribed, if he/she secures NOT LESS THAN 40% of the marks prescribed for the examination. He/she shall be declared to have passed the whole examination, if he/she passes in all the papers and practical's wherever prescribed as per the scheme of examinations earning 140 CREDITS. He/she shall also fulfill the compulsory extension services prescribed earning a minimum of 1 credit out of maximum of 2 credits to qualify for the degree.

9. CLASSIFICATION OF SUCCESSFUL CANDIDATES

i) FOUNDATION COURSES:

- a) LANGUAGE OTHER THAN ENGLISH: Successful candidates passing the examinations for the Language and securing the marks (1) 60 percent and above and (2) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND Class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD Class.
- b) ENGLISH: Successful candidates passing the examinations for English and securing the marks (1) 60 percent and above and (2) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD class.

ii) CORE COURSE (Consisting of (a) Main Subjects; b) Allied subjects; c) Application Oriented subjects and Practical's, etc. if any)

Successful candidates passing the examinations for Core Courses together and securing the marks 1)60 percent and above (2) 50 percentage above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the FIRST and SECOND class respectively. All other successful candidates shall be declared to have passed the examinations in the THIRD class.

iii) COMPULSORY EXTENSION SERVICE:

Successful Candidates earning a minimum of 1 credit or a maximum of 2 credits SHALL NOT BE taken into consideration for Classification/Ranking/Distinction.

10. RANKING

Candidates who pass all the examinations prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for Classification/Ranking/Distinction.

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations.7.(iii) supra are only eligible for Classification / Distinction.

PATTERN OF QUESTION PAPER

Maximum Marks: - 75 Marks

Time:- 3 Hours

Part – A (50 Words)

To answer any TEN Questions out of Twelve Questions

10x2=20 Marks

Part – B (200 Words)

To answer any FIVE Questions out of Eight Questions

5 x 5=25 Marks

Part – C (500 Words)

To answer Any THREE Questions out of Five Questions

3x10=30 Marks

QUESTION PAPER FOR PRACTICALS

The external examiner will prepare a question paper on the Spot with the help of the Question Bank Supplied by the Controller's Office.

Part – A (50 Words)

Define, Find, Identify, Indicate, List, Label, Name, State, What, When, Where, Which; Who

((REFER BLOOM'S TAXONOMY

GIVEN IN THE NEXT PAGE)

6 questions from

K 1 – Remembering

And

6 questions from

K 2 – Understanding

Part – B (200 Words)

Analyze, Classify, Determine, Discuss, Evaluate, Explain, Illustrate, Justify, Prepare, Show, Sketch, Solve, State

2 questions from K 3 – Applying

2 questions from K 4 – Analyzing

2 questions from K 5 – Evaluating

2 questions from K 6 -- Creating

Part – C (500 Words)

Analyze, Determine, Appraise, Develop, Assess, Differentiate, Elucidate, Elaborate, Construct, Interpret, Deduce, Justify & Solve

1 question from K 3 – Applying,

1 question from K 4 – Analyzing,

1 question from K 5 – Evaluating,

1 question from K 6- Creating and

1 question from K3/K4/K5/K6

BCA SCHEME OF EXAMINATIONS

APPENDIX - I

I YEAR – I SEMESTER

S.No.	Course Components	Name of the Course	Credits	Max. Marks			Exam Duration (Hrs)
				Internal	External	Total	
1	Part - 1	Language	3	25	75	100	3
2	Part - 2	English	3	25	75	100	3
3	Part - 3	Programming in C++	5	25	75	100	3
		Programming in C++ Lab	5	25	75	100	3
		Elective I-Statistics I	3	25	75	100	3
4	Part - 4	SEC-I Office Automation lab	2	25	75	100	3
		FC –Problem Solving Techniques	2	25	75	100	3
Total Credits			23				

I YEAR – II SEMESTER

S.No.	Course Components	Name of the Course	Credits	Max. Marks			Exam Duration (Hrs)
				Internal	External	Total	
1	Part - 1	Language	3	25	75	100	3
2	Part - 2	English	3	25	75	100	3
3	Part - 3	Data Structure and Algorithm	5	25	75	100	3
		Data Structure and Algorithm Lab	5	25	75	100	3
		Elective –II Resource Management Techniques	3	25	75	100	3
4	Part - 4	SEC-II - Quantitative Aptitude.	2	25	75	100	3
		SEC-III -Advanced Excel Lab	2	25	75	100	3
Total Credits			23				

II YEAR – III SEMESTER

S.No.	Course Components	Name of the Course	Credits	Max. Marks			Exam Duration (Hrs)
				Internal	External	Total	
1	Part - 1	Language	3	25	75	100	3
2	Part - 2	English	3	25	75	100	3

3	Part - 3	Core Course V – Python Programming	5	25	75	100	3
		Core Course VI – Python Programming Lab	5	25	75	100	
		Elective III- Financial Accounting	3	25	75	100	
4	Part - 4	SEC – IV Web Designing	2	25	75	100	3
		SEC-V- Web Designing Lab	2	25	75	100	
		EVS	-				
			23				

II YEAR – IV SEMESTER

S.No.	Course Components	Name of the Course	Credits	Max. Marks			Exam Duration (Hrs)
				Internal	External	Total	
1	Part - 1	Language	3	25	75	100	3
2	Part - 2	English	3	25	75	100	3
3	Part - 3	Core Course VII –Java Programming	5	25	75	100	3
		Core Course VIII JAVA Programming Lab	5	25	75	100	
		Elective IV- Cost and Management Accounting	3	25	75	100	
4	Part - 4	SEC VI- PHP Programming	2	25	75	100	3
		SEC VII- PHP Programming Lab	2	25	75	100	3
		EVS	2	25	75	100	3
			25				

III YEAR – V SEMESTER

S.No.	Course	List of Courses	Credit	Max. Marks			Exam Duration
				Internal	External	Total	

	Component					(Hrs)	
1	Part - 3	Core Course IX – Operating System	4	25	75	100	3
		Core Course X – Database Management System	4	25	75	100	3
		Core Course XI – Operating System Lab	4	25	75	100	3
		Core Course XII - Database Management System Lab	4	25	75	100	3
		Elective I- Introduction to Data Science	3	25	75	100	3
		Elective II- Multimedia System	3				
2	Part - 4	Value Education	2	25	75	100	3
		Internship / Industrial Training(Summer vacation at the end of IV semester activity)	2	25	75	100	
		Total	26				

III YEAR – VI SEMESTER

S.No.	Course	List of Courses	Credit	Max. Marks			Exam Duration (Hrs)	
				Internal	External	Total		
1	Part - 3	Core Course XII - R Programming	4	25	75	100	3	
		Core Course XIV – Data communication and Networking	4	25	75	100	3	
		Core Course XV- R Programming LAB	4	25	75	100	3	
		Elective-III– Mini Project Lab	3	25	75	100	3	
			Elective -IV-Software Engineering	3	25	75	100	3
			Extension Activity	1	25	75	100	3
2	Part - 4	Professional Competency Skill Cloud Computing	2	25	75	100	3	
		Total	21	30				
		Overall Total	141					

CORE PAPER
FIRST YEAR SEMESTER-I
SEMESTER-I

Title of the Course/Part	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC1	PROGRAMMING in C++	Core	-	5	-	-	5	5	25	75	100
Course Objective											
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects										
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors etc.										
LO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism										
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming										
LO5	Demonstrate the use of various OOPs concepts with the help of programs										
UNIT	Details										No. of Hours
I	Introduction to C++ - key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages–I/O in C++- C++ Declarations. Control Structures:-Decision Making and Statements: If. Else, jump, go to, break, continue, and Switch case statements - Loops in C++: for, while, do - functions in C++ - inline functions – Function Over loading.										15
II	Classes and Objects: Declaring Objects – Defining Member Functions –Static Member variables and functions – array of objects–friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.										15

III	Operator Overloading: Overloading unary, binary operators– Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance–Virtual base Classes–Abstract Classes.	15
IV	Pointers–Declaration–Pointer to Class, Object–this pointer–Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object –Binding, Polymorphism and Virtual Functions	15
V	Files –File stream classes –file modes–Sequential Read /Write operations–Binary and ASCII Files–Random Access Operation– Templates –Exception Handling- String –Declaring and Initializing string objects–String Attributes–Miscellaneous functions.	15
	Total	75

Course Outcomes		Program Outcome
CO	Upon completion of the course the students would be Able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C(data types, operators, branching and looping, arrays, functions, Structures ,pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4,PO7
4	Analyse the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
Text Book		
1	E.Balagurusamy,-Object-Oriented Programming with C++ ,TMH2013,7thEdition.	
Reference books		
1.	Ashok N Kamthane,-Object-Oriented Programming with ANSI and Turbo C++ , PearsonEducation2003.	
2.	MariaL it vin & GrayLitvin,-C++foryou ,Vikaspublishation2002.	
Web Resources		
1.	https://alison.com/course/introduction-to-c-plus-plus-programming	

Mapping with Program Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	-	-	1
CO2	2	2	2	1	-	-
CO3	3	1	1	-	1	-
CO4	1	2	1	2	2	1
CO5	3	2	1	2	3	2
Weightage of course contributed to each	12	9	6	5	6	4
PSO						

S-Strong-3 M-Medium-2L-Low-1

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC2	PROGRAMMING in C++ Lab	Core	-	-	5	-	5	5	25	75	100
Course Objective											
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects										
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors , etc.										
LO3	Describe the concept of function over loading, operator overloading, virtual functions and polymorphism										
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming										
LO5	Demonstrate the use of various OOPs concepts with the help of programs										
S.No	Details										No. of Hours
1	Write a C++ program to demonstrate function overloading, Default Argument and Inline function.										
2	Write a C++ program to demonstrate Class and Objects										
3	Write a C++ program to demonstrate the concept of Passing Objects to Functions										
4	Write a C++ program to demonstrate the Friend Functions.										
5	Write a C++ program to demonstrate the concept of Passing Objects to Functions										
6	Write a C++ program to demonstrate Constructor and Destructor										
7	Write a C++ program to demonstrate Unary Operator Overloading										

8	Write a C++ program to demonstrate Binary Operator Overloading	
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9	Write a C++ program to demonstrate: <ul style="list-style-type: none"> • Single Inheritance • Multilevel Inheritance • Multiple Inheritance • Hierarchical Inheritance • Hybrid Inheritance 	75
10	Write a C++ program to demonstrate Virtual Functions.	
11	Write a C++ program to manipulate Text File.	
12	Write a C++ program to perform Sequential I/O Operations on a file.	
13	Write a C++ program to find the Biggest Number using Command Line Arguments	
14	Write a C++ program to demonstrate Class Template	
15	Write a C++ program to demonstrate Function Template.	
16	Write a C++ program to demonstrate Exception Handling.	
Course Outcomes		Program Outcome
CO	Upon completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C(data types , operators, branching and looping, arrays, functions, structures pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
Text Book		
1	E.Balagurusamy,-Object-Oriented Programming with C++ ,TMH2013,7thEdition.	

Reference Books	
1.	Ashok N Kamthane,-Object-Oriented Programming with ANSI and Turbo C++ , PearsonEducation2003.
2.	Maria Litvin & Gray Litvin,-C++for you , Vikas publication2002.
Web Resources	
1.	https://alison.com/course/introduction-to-c-plus-plus-programming

Mapping with Program Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	1	2
CO2	2	3	3	3	1	2
CO3	2	3	3	3	1	2
CO4	2	3	3	3	1	2
CO5	2	3	3	3	1	2
Weightage of course contributed to each PSO	11	15	15	15	5	10

S-Strong-3 M-Medium-2L-Low-1

BCA DEGREE PROGRAMME IN COMPUTER SCIENCE

SYLLABUS WITH EFFECT FROM 2023-2024

Year: I

Semester: I

Elective: Elective I-Statistics (Common to B.Sc.-CS with AI, CS with DS, Software Appl. &BCA)	
Lecture Hours:5 per week	
Credits:3	
Learning Objectives: (for teachers :what they have to do in the class/lab/field)	
Course Outcomes: (for students :To know what they are going to learn)	
<ol style="list-style-type: none"> 1. Know the uses of statistics in society 2. Organize, manage and present data 3. Analyse the statistical data graphically using frequency distribution and cumulative frequency distribution. 4. Analyse statistical data using measures of central tendency, dispersion and location. 5. To understand correlation between continuous variables and association between categorical variables. 	
Units	Contents
I	Methods of collection: Complete enumeration – Sample Survey - Primary data - Secondary data sources - Types of variables. Nominal, ordinal and scale data. Presentation of Data: Presentation of data by tables-construction of tables (Uni variate and Bi variate) –frequency table and contingency table.
II	Diagrammatic presentation: Line diagram, Bar diagrams: Simple, multiple, sub divided and Percentage-Pie chart, comparative pie chart-Graphical representation of a frequency distribution by histogram and frequency polygon and Ogives.
III	Analysis of Data(Uni variate):Measures of central tendency :Arithmetic mean-Median and Mode choice of an average-characteristic of a good average
IV	Measures of dispersion:Range-Quartile deviation-meandeviation-standard deviation-relative measures of dispersion-Coefficient of Variance
V	Analysis of Data (Bivariate): Correlation- Scatter plot-coefficient of correlation-Pearson's Correlation Coefficient, Spearman's rank correlation coefficient-correlation coefficient for Bivariate frequency table.
Suggested Readings:	
Books for study:	
<ol style="list-style-type: none"> 1. Gupta,S.CandKapoor,V.K(2002),<i>Fundamentals of Mathematical Statistics</i>,Sultan Chand and Sons,New Delhi. 2. GoonA.M.,GuptaM.K.andDasguptaB.(2002):<i>Fundamentals of Statistics</i>,Vol.I&II,8th Edn.The World Press,Kolkata. 3. IrwinMiller,MaryleesMiller(2006):<i>JohnE.Freund's Mathematical Statistics with Applications</i>,(7thEdn.),Prentice Hall International INC. 4. Mood,A.M.Graybill,F.A.andBoes,D.C.(2007):<i>Introduction to the Theory of Statistics</i>,3rd Edn.,(Reprint),Tata McGraw-Hill Pub.Co.Ltd 	

Course Code: SEC-1	Office Automation Lab		Credits: 2
Lecture Hours: (L) per week: 2	Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week: 2
Course Category : SEC-1	Year & Semester: I Year I Semester	Admission Year:	
Pre-requisite	Basic skills in Computer operations		
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> • The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point. • The course is highly practice oriented rather than regular class room teaching. • To acquire knowledge on editor, spread sheet and presentation software. 			
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1: Understand the basics of computer systems and its components.</p> <p>CO2: Understand and apply the basic concepts of a word processing package.</p> <p>CO3: Understand and apply the basic concepts of electronic spreadsheet software.</p> <p>CO4: Understand and apply the basic concepts of database management system.</p> <p>CO5: Understand and create a presentation using PowerPoint tool.</p>			
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>			
S.no	Contents	Required Hours	
I	<p>LIST OF PROGRAMS:</p> <p>I. WORD PROCESSING</p> <p>1. Text manipulation</p> <p>Change the font size and type</p> <p>Aligning and justification of text</p> <p>Underlining the Text</p> <p>Indenting the Text</p>		

	<p>i. Prepare a Bio-Data ii. Prepare a letter</p> <p>2. Usage of Numbering, Bullets, Footers and Headers</p> <p>Usage of Spell checks and Find and Replace</p> <p>i. Prepare a document in news paper format ii. Prepare a document with bullets and footers and headers.</p> <p>3.Tables and Manipulations</p> <p>Creations, Insertion, Deletion (Columns & Rows) and usage of Auto Format</p> <p>i. Create a mark sheet using table and find out the total marks. ii. Create a calendar and Auto format it</p> <p>4.Picture Insertion and alignment</p> <p>i. Prepare a greeting card ii. Prepare a handout</p> <p>5. Creation of documents using templates Creation of Templates</p> <p>i. Prepare a letter using any template ii. Prepare two data using various kinds of templates</p> <p>6. Mail Merge concepts</p> <p>i. Prepare a business letter for more than one company using mail merge ii. Prepare an invitation to be sent to specific addresses in the data source.</p> <p>7. Copying text and pictures from Excel</p> <p>i. Draw a chart in Excel and paste it on word ii. Import a picture from Excel and edit the picture.</p>	
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II. MS-EXCEL

1. Prepare a Mark List for students (use Conditional Formatting).
2. Arrange data in Ascending and Descending order.
3. Pay bill Preparation.
4. Prepare a Calendar - Auto formatting
5. EB bill Preparation.
6. Creating a chart.
7. Prepare an Inventory bill for a company (use Freeze Panes, Track Changes).
8. Insertion, Deletion, Merging and Formatting of cells

III-MS POWERPOINT

1. Design presentation slides for a product of your choice. The slides must include name, brand name, type of product, characteristics, special features, price, special offer etc. Add voice if possible to explain the features of the product. The presentation should work in manual mode. (Apply Animation schemes and Slide Transition)
2. Design slides for the headlines News of a popular TV Channel. The Presentation Should contain the following transactions: Top down, Bottom up, Zoom in and Zoom out. The presentation should work in custom mode.
3. Animate a Smile Face (Cry, Normal, Smile).

Learning Resources:

- **Recommended Texts**

1. Peter Norton, “Introduction to Computers” –Tata McGraw-Hill.

- **Reference Books**

1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw- Hill.

- **Web resources :** Web content from NDL / SWAYAM or open source web resources

Course Code: FC1	Problem Solving Techniques		Credits: 2
Lecture Hours: (L) per week: 2	Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week: 2
Course Category : FC	Year & Semester:I Year I Semester		Admission Year:
Pre-requisite	Basic of Problem-solving skills		
Learning Objectives: <ul style="list-style-type: none"> • To understand the importance of algorithms and programs, and to know of the basic problem solving strategies. • To learn efficient strategies and algorithms to solve standard problems, thus laying a firm foundation for designing algorithmic solutions to problems. 			
Course Outcomes: (for students: To know what they are going to learn) CO1: Understand the systematic approach to problem solving. CO2: Know the approach and algorithms to solve specific fundamental problems. CO3: Understand the efficient approach to solve specific factoring-related problems. CO4: Understand the efficient array-related techniques to solve specific problems. CO5: Understand the efficient methods to solve specific problems related to text processing. Understand how recursion works.			
Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)			
Units	Contents		Required Hours
I	Introduction: Notion of algorithms and programs – Requirements for solving problems by computer – The problem-solving aspect: Problem definition phase, Getting started on a problem, The use of specific examples, Similarities among problems, Working backwards from the		6

	solution – General problem-solving strategies - Problem solving using top-down design – Implementation of algorithms – The concept of Recursion.	
II	Fundamental Algorithms: Exchanging the values of two variables – Counting - Summation of a set of numbers - Factorial computation - Sine function computation - Fibonacci Series generation - Reversing the digits of an integer – Base Conversion.	6
III	Factoring Methods: Finding the square root of a number – The smallest divisor of an integer – Greatest common divisor of two integers - Generating prime numbers – Computing the prime factors of an integer – Generation of pseudo-random numbers - Raising a number to a large power – Computing the n th Fibonacci number.	6
IV	Array Techniques: Array order reversal – Array counting or histogramming – Finding the maximum number in a set - Removal of duplicates from an ordered array - Partitioning an array – Finding the k^{th} smallest element – Longest monotone subsequence.	6
V	Text Processing and Pattern Searching: Text line length adjustment – Left and right justification of text – Keyword searching in text – Text line editing – Linear pattern search. Recursive algorithms: Towers of Hanoi – Permutation generation.	6
Extended Professional Component (is a part of internal	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	

component only, Not to be included in the External Examination question paper)		
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	
<p>Learning Resources:</p> <ul style="list-style-type: none"> ● Recommended Texts 1. R. G. Dromey, <i>How to Solve it by Computer</i>, Pearson India, 2007. ● Reference Books 1. George Polya, Jeremy Kilpatrick, <i>The Stanford Mathematics Problem Book: With Hints and Solutions</i>, Dover Publications, 2009 (Kindle Edition 2013). 2. Greg W. Scragg, <i>Problem Solving with Computers</i>, Jones & Bartlett 1st edition, 1996. ● Web resources 		

**FIRST YEAR
Semester II**

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst .Hours	M a r k s		
									CIA	External	Total
CC III	Data Structures and Algorithms	Core	-	5	-	-	5	5	25	75	100
Course Objective											
LO1	Ability to choose appropriate data structure as applied to specified problem definition.										
LO2	To learn linear data structures-lists, stacks, queues										
LO3	To learn Linked list structures and its application										
LO4	To learn Tree and graph structures and application of graphs										
LO5	To introduce the basic concepts of algorithms and give clear idea on algorithmic design paradigms like Dynamic Programming, Backtracking, Branch and Bound										
UNIT	Details									No. of Hours	
I	INTRODUCTION TO DATA STRUCTURES: <ul style="list-style-type: none"> ● Data Structures: Definition- Time & Space Complexity, ● Arrays: Representation of arrays, Applications of arrays, sparse matrix and its representation, ● Linear list: Singly linked list implementation, insertion, deletion and searching operations on linear list ● Circular linked list: implementation, Double linked list implementation, insertion, deletion and searching operations. Applications of linked lists- Dynamic Storage management. 									15	
II	STACKS: <ul style="list-style-type: none"> ● Operations, array and linked representations of stack, 									15	

	<ul style="list-style-type: none"> ● stack applications, infix to postfix conversion, postfix expression evaluation, recursion implementation 	
III	<p>QUEUES, TREES & GRAPHS:</p> <ul style="list-style-type: none"> ● Queues: operations on queues, array and linked representations. ● Circular Queue: operations,, applications of queues. ● Trees: Definitions and Concepts- Representation of binary tree, Binary tree traversals (Inorder, Postorder , preorder), ● Binary search trees ● Graphs : Representation of Graphs- Types of graphs -Breadth first traversal – Depth first traversal- -Applications of graphs – 	15
IV	<p>INTRODUCTION TO ALGORITHMS:</p> <ul style="list-style-type: none"> ● INTRODUCTION: Definition of Algorithms- Overview and importance of algorithms- pseudocode conventions, Asymptotic notations, practical complexities. ● Divide-and-Conquer: : General Method – Binary Search- Quick Sort- Merge Sort. ● Greedy Method: General method- Knapsack problem- Tree vertex splitting- Job sequencing with deadlines 	15
V	<p>DYNAMIC PROGRAMMING, BACKTRACKING & BRANCH & BOUND</p> <ul style="list-style-type: none"> ● Dynamic programming: General method, Multistage Graphs, All pairs shortest path, Single source shortest path. ● Backtracking: General method, 8 Queens, Graph coloring, Hamiltonian cycle. ● Branch & Bound: General method, Travelling salesperson problem. 	15
	Total	75
Course Outcomes		Program Outcome

CO	On completion of this course, students will	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO6
2	Understand basic data structures such as arrays , linked lists, stacks and queues	PO2
3	Describe the hash function and concepts of collision and Its resolution methods	PO2,PO4
4	Solve problem involving graphs, trees and heaps	PO6,PO8
5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO7
Text Book		
1	MarkAllen Weiss,-Data Structures and Algorithm Analysis in C++ , Pearson Education 2014, 4th Edition.	
2	Reema Thareja,-Data Structures Using C , Oxford Universities Press 2014, 2nd Edition	
Reference Books		
1.	ThomasH. Cormen ,Chales E.Leiserson, RonaldL. Rivest, Clifford Stein, -Introduction to Algorithms , McGrawHill2009, and 3rd Edition.	
2.	Aho, Hopcroft and Ullman,-Data Structures and Algorithms , Pearson Education 2003	
Web Resources		
1.	NPTEL & MOOC courses titled Data Structures	
2.	https://nptel.ac.in/courses/106106127/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	-	1	-
CO2	1	2	1	-	-	-
CO3	3	1	2	1	-	-
CO4	2	2	1	-	-	1
CO5	3	1	1	-	-	-
Weightage of course Contributed to each PSO	12	9	8	1	1	1

S-Strong-3 M-Medium-2L-Low-1

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst .Hours	M a r k s		
									CIA	External	Total
CC IV	Data Structures and Algorithms Lab	Core	-	-	5	-	5	5	25	75	100
Course Objective											
LO1	To understand the concepts of ADTs										
LO2	To learn linear data structures-lists, stacks, queues										
LO3	To learn Tree structures and application of trees										
LO4	To learn graph structures and application of graphs										
LO5	To understand various sorting and searching										
Sl. No	Details										No. of Hours
1.	Array implementation of stacks										
2.	Array implementation of Queues										
3.	Linked list implementation of stacks										
4.	Linked list implementation of Queues										
5.	Binary Tree Traversals (In order , Preorder, Post order)										
6.	Implementation of Linear search and binary search										
7.	Implementation Insertion sort, Quick sort and Merge Sort										
8.	Implementation of Depth-First Search & Breadth-First Search of Graphs.										
9.	Finding all pairs of Shortest Path of a Graph.										
10.	Finding single source shortest path of a Graph.										
	Total										

Course Outcomes		Program Outcome
CO	On completion of this course, students will	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO4,PO5
2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO1,PO4,PO8
3	Describe the hash function and concepts of collision and Its resolution methods	PO1,PO3,PO6
4	Solve problem involving graphs, trees and heaps	PO3,PO4
5	Apply Algorithm for solving problems like sorting, searching ,insertion and deletion of data	PO1,PO5,PO6
Text Book		
1	Mark Allen Weiss,- Data Structures and Algorithm Analysis in C++ ,Pearson Education2014,4th Edition.	
2	ReemaThareja,-DataStructuresUsingC ,OxfordUniversitiesPress2014,2nd Edition	
Reference Books		
1	ThomasH.Cormen,ChalesE.Leiserson,RonaldL.Rivest,CliffordStein,-Introduction to Algorithms ,McGrawHill2009,3rdEdition	
2.	Aho,HopcroftandUllman,-DataStructuresandAlgorithms ,PearsonEducation2003	
Web Resources		
1.	NPTEL & MOOC courses titled Data Structures	
2.	https://nptel.ac.in/courses/106106127/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	1	-
CO2	1	2	1	-	-	2
CO3	3	1	2	1	-	-
CO4	2	2	1	2	3	1
CO5	3	2	1	-	-	-
Weightage of course contributed to each	12	10	8	5	4	4
PSO						

S-Strong-3 M-Medium-2L-Low-1

Course Code: SEC-2	Quantitative Aptitude		Credits: 2
Lecture Hours: (L) per week: 2	Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week: 2
Course Category :SEC-2	Year & Semester : I Year II Semester	Admission Year:	
Pre-requisite	Basic knowledge in numerical ability		
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> • To improve the quantitative skills of the students • To prepare the students for various competitive exams 			
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1: To gain knowledge on LCM and HCF and its related problems CO2: To get an idea of age, profit and loss related problem solving. CO3: Able to understand time series simple and compound interests CO4: Understanding the problem related to probability, and series</p> <p>CO5: Able to understand graphs, charts</p>			
Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)			
Units	Contents	Required Hours	
I	Numbers - HCF and LCM of numbers - Decimal fractions - Simplification - Square roots and cube roots - Average - problems on Numbers	6	
II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion - partnership - Chain rule.	6	
III	Time and work - pipes and cisterns - Time and Distance - problems on trains - Boats and streams - simple interest - compound interest - Logarithms - Area - Volume and surface area - races and Games of skill.	6	

IV	Permutation and combination - probability - True Discount - Bankers Discount Height and Distances - Odd man out & Series.	6
V	Calendar - Clocks - stocks and shares - Data representation - Tabulation - Bar Graphs - Pie charts - Line graphs	6
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	30
<p>Learning Resources:</p> <ul style="list-style-type: none"> ● Recommended Texts <ol style="list-style-type: none"> 1. . “Quantitative Aptitude”, R.S. AGGARWAL., S. Chand & Company Ltd., ● Web resources: Authentic Web resources related to Competitive examinations 		

Course Code: SEC-3	Advanced Excel Lab		Credits: 2
Lecture Hours: (L) per week: 2	Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week: 2
Course Category : SEC-3	Year & Semester:I Year II Semester	Admission Year:	
Pre-requisite	Basic knowledge in office automation / Excel		
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <p>The objective of this course is to help the students learn the advanced features of Excel, to summarize, analyze, explore, and present visualizations of data in the form of charts, graphs.</p>			
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1: Handle large amounts of data</p> <p>CO2: Aggregate numeric data and summarize into categories and subcategories</p> <p>CO3: Filtering, sorting, and grouping data or subsets of data</p> <p>CO4: Create pivot tables to consolidate data from multiple files</p> <p>CO5: Presenting data in the form of charts and graphs</p>			
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>			
Units	Contents		Required Hours

	<ol style="list-style-type: none"> 1. Prepare a Mark List for Students(Use Conditional Formatting). 2.Arrange data in Ascending & descending Order. 3.Prepare a Calendar by using Auto Formatting. 4.Creating Chart. 5.Prepare an inventory bill for a company (use Freeze Panel , track changes). 6.Working with Functions like Absolute, writing conditional Expressions(f), and using Logical functions (AND, OR, NOT) 7.Data Validation (Number, Date & Time Validation). 8.Working with Report using Pivot tables. 9.Macros-Relative & Absolute Macros. 10.Implementing EB Bill by using Excel Formula's. 	
<p>Learning Resources:</p> <ul style="list-style-type: none"> ● Recommended Tex Excel 2019 All-in-One For Dummies – 2018- Greg Harvey ● Reference Books Microsoft Excel 2019 Pivot Table Data Crunching-2019,Bill Jelen and Michael Alexander ● Web resources: Web resources from NDL Library, E-content from open source libraries 		

	Resource Management Techniques		Credits: 3
Course Code: Elective-II			
Lecture Hours: (L) per week: 5	Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week: 4
Course Category :	Year & Semester: I Year II Semester	Admission Year:	
Pre-requisite	Basic Knowledge on LPP		
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <p>To understand the mathematical concepts like LPP, graphical solutions</p>			
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1: To gain knowledge on LPP CO2: Able to understand different mathematical models CO3: To get an idea on game theory CO4: Understanding the different form of sequencing problem CO5: Able to understand Relations and its applications of transportation and assignment model</p>			
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>			
Units	Contents		Required Hours
I	<p>Linear Programming: Formulation of different types of linear programming – meaning of linear programming- Canonical and standard form of linear programming-Methods for solving LPP– Mathematical formulation of L.P.P – Graphical method -Simplex methods. Simple problems.</p>		
II	<p><i>Transportation Model – Mathematical formulation of a</i></p>		

	<p>transportation problem – Basics of transportation problem -Methods for finding initial basic feasible solution – Formulation and solving methods-North west corner rule , Least cost entry method and Vogel’s Approximation method - Balanced and Unbalanced transportation problem –</p>	
III	<p>Assignment problem – Mathematical formulation of an assignment problem – Assignment Algorithm – Balanced and Unbalanced assignment problem – Simple problems.</p>	
IV	<p>Sequencing problems – Processing with N jobs through two machines- Processing with N jobs through three machines-simple problems</p>	
V	<p>Game theory – Two person zero Sum game - Maxmin – Minmax principle – Saddle point and value of the Game – Game without saddle point, Mixed strategies – Dominance property Graphical method for $2 \times n$ and $m \times 2$ games</p>	
<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>	

	<p>Text Books:</p> <p>Sundaresan V and K.S.Ganapathy Subramanian, Contents and Treatment in ResourceManagement Techniques, 4 th Ed., A.R.Publications, Chennai.</p> <p>Reference Books:</p> <p>1. Kanti Swarup, P.K.Gupta, Man Mohan, Operations Research, 15 th Ed., Sultan Chand& Sons, New Delhi, 2010.</p> <p>2. Prem Kumar Gupta, D.S. Hira,</p> <p>Web resources: Web resources from NDL Library, E-content from open-sourcelibraries</p>	
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SECOND YEAR
Semester-III

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
CC - V	PYTHON PROGRAMMING		-	5	-	-	5	25	75	100
Learning Objectives										
LO1	To make students understand the concepts of Python programming.									
LO2	To apply the OOPs concept in PYTHON programming.									
LO3	To impart knowledge on demand and supply concepts									
LO4	To make the students learn best practices in PYTHON programming									
LO5	To know the costs and profit maximization									
UNIT	Contents									No. of Hours
I	Basics of Python Programming: History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements –Input Statements-Comments –Indentation-Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays–Array methods.									15
II	Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.									15
III	Functions: Function Definition – Function Call – Variable Scope and its Life time- Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments Recursion. Python Strings: String operations-Immutable Strings - Built-in String Methods and Functions - String Comparison.									15

	Modules: import statement- The Python module – dir(.) function – Modules and Namespace–Defining our own modules.	
IV	Lists: Creating a list –Access values in List-Updating values in Lists-Nested lists-Basic list operations-List Methods. Tuples: Creating, Accessing ,Updating and Deleting Elements in a tuple – Nested tuples –Difference between lists and tuples. Dictionaries and Sets: Dictionary type in Python - Set Data type.	15
V	Python File Handling : Types of files in Python -Opening and Closing files- Reading and Writing files: write() and write lines() methods-append()method–read()and readlines()methods–with keyword– Splitting words –File methods-File Positions-Renaming and deleting files.	15
TOTAL HOURS		75
Course Out comes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1,PO2,PO3, PO4,PO5,PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1,PO2,PO3, PO4,PO5,PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions Strings and modules.	PO1,PO2,PO3, PO4,PO5,PO6
CO4	Work with List ,tuples and dictionary ,Write program using list, Tuples and dictionary.	PO1,PO2,PO3, PO4,PO5,PO6
CO5	Usage of File handling s in python, Concept of reading and writing files, Do programs using files.	PO1,PO2,PO3, PO4,PO5,PO6
Textbooks		

1	Reema Thareja, Python Programming using problem solving approach, First Edition, 2017, Oxford University Press.
2	Dr.R.Nageswara Rao, -Core Python Programming, First Edition, 2017, Dream tech Publishers.
Reference Books	
1.	Vamsi Kurama,-Python Programming :A Modern Approach, Pears on Education.
2.	Mark Lutz, L earning Python , Orielly.
3.	Adam Stewarts,-Python Programming ,Online.
4.	Fabio Nelli,-Python Data Analytics ,A Press.
.	KennethA.Lambert,-Fundamentals of Python-First Programs CENGAGE Publication.
Web Resources	
1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	2	2	3	2	3
CO3	3	2	2	3	2	2
CO4	3	2	2	3	2	3
CO5	3	2	2	3	3	3
Weight age of course contributed to each	15	10	10	15	13	14
PSO						

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
CC VI	PYTHON PROGRAMMING LAB		-	-	5	-	5	25	75	100
Course Objectives: <ol style="list-style-type: none"> 1. Be able to design and program Python applications. 2. Be able to create loops and decision statements in Python. 3. Be able to work with functions and pass arguments in Python. 4. Be able to build and package Python modules for reusability. 5. Be able to read and write files in Python. 										
LAB EXERCISES									Required Hours	
<ol style="list-style-type: none"> 1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice. 2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria: <ul style="list-style-type: none"> 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. Program to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user. 4. Write a Python script that prints prime numbers less than 20. 5. Program to find factorial of the given number using recursive function. 6. Write a Python program to count the number of even and odd numbers from array of N numbers. 7. Write a Python class to reverse a string word by word. 8. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input : tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3) 9. Write a Python program to construct the following pattern, using a nested loop 										

* ** *** **** ***** ***** **** *** ** *	
10. Program using Dictionaries. 11. Program using Set. 12. Read a file content and copy only the contents at odd lines into a new file.	

Course Out comes

On completion of this course, students will

CO1	To understand the problem solving approaches
CO2	To learn the basic programming constructs in Python
CO3	To practice various computing strategies for Python-based solutions to real world problems
CO4	To use Python data structures - lists, tuples, dictionaries.
CO5	To do input/output with files in Python.

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
Elective	FINANCIAL ACCOUNTING		-	5	-	-	3	25	75	100

Learning Objectives

LO1	To Understand basic accounts concepts
LO2	To know Objectives of accounting in any business are systematically record transactions,

	sorting and analyzing them	
LO3	To prepare financial statements, assessing the financial position, and aiding in decision-making with financial data and information about the business.	
LO4	To ascertain profit or loss of the business:	
LO5	To know basic of single entry and double entry	
UNIT	Contents	No. of Hours
I	meaning and scope of accounting, basic accounting concepts and conventions objective of accounting- accounting transaction-double entry book keeping-journal, ledger preparation of trail balance, preparation of cash book.	
II	subsidiary books-classifications of errors-rectification of errors-preparation of suspense accounts-bank reconciliation statement (BRS).	
III	preparation of financial accounts of sold trading concern-adjustments-closing stock ,outstanding and prepaid items, depreciation, provision for bad debts, provision for discount on debtors ,interest on capital and drawings.	
IV	depreciation-meaning, causes, types-straight line method, written down value method-average due day.	
V	single entry-meaning, features, defect, difference between single entry and double entry-statement of affairs method- debtor account and credit accounts-calculation of purchase and sales.	
TOTAL HOURS		
Course Out comes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Acquire the basic concept of business communication	PO1,PO2,PO3,P O4,PO5,PO6

CO2	Exposed to effective business letter.	PO1,PO2,PO3,PO4,PO5,PO6
CO3	Paraphrase the concept of various correspondences.	PO1,PO2,PO3,PO4,PO5,PO6
CO4	Recognize the various business communications.	PO1,PO2,PO3,PO4,PO5,PO6
CO5	Classify the effective means of business communications.	PO1,PO2,PO3,PO4,PO5,PO6

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	2	2	3	2	3
CO3	3	2	2	3	2	2
CO4	3	2	2	3	2	3
CO5	3	2	2	3	3	3
Weight age of course contributed to each	15	10	10	15	13	14
PSO						

S-Strong-3 M-Medium-2L-Low-1

Course Code:SEC-IV	Web Designing		Credits: 2
Lecture Hours: (L) per week: 2	Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week: 2
Course Category :SEC	Year & Semester: II Year III Semester	Admission Year:	
Pre-requisite			
<ul style="list-style-type: none"> ● Insert a graphic with in a webpage. ● Create a link with in a webpage. 			

<ul style="list-style-type: none"> ● Create a table with in a webpage. ● Insert heading levels within a webpage. ● Insert ordered and unordered lists with in a webpage .Create a webpage. 		
<p>On completion of this course, students will</p> <p>CO1 : Knows the basic concept in HTML Concept of resources in HTML</p> <p>CO2: Knows Design concept.</p> <p>CO3: Understand the page formatting. Concept of list</p> <p>CO4 : Creating Links. Know the concept of creating link to email address</p> <p>CO5 : Concept of adding images and Understand the table creation.</p>		
UNIT	Contents	Required Hours
I	Introduction : Web Basics: What is Internet– Web browsers–What is Webpage –HTML Basics: Understanding tags.	6
II	Tags for Document structure (HTML, Head , Body Tag). Block level text elements: Headings paragraph(<p>tag)– Font style elements:(bold, italic, font, small, strong, strike, big tags)	6
III	Lists: Types of lists: Ordered, Unordered–Nesting Lists – Other tags: Marquee, HR,BR-Using Images–Creating Hyperlinks.	6
IV	Tables: Creating basic Table, Table elements, Caption– Table and cell alignment– Row span, Colspan –Cell padding.	6
V	Frames: Frameset– Targeted Links–No frame–Forms: Input, Text area, Select, Option.	6

Learning Resources:

1. **Mastering HTML5 and CSS3 MadeEasy**, TeachUComp Inc., 2014.
2. **Thomas Michaud “Foundations of Web Design: Introduction to HTML & CSS”**

Web resources

1. <https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf>
2. <https://www.w3schools.com/html/default.asp> .

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
SEC- V	Web Designing Lab	Specific Elective	-	-	2		2	25	75	100
Learning Objectives										
LO1	Insert a graphic with in a webpage									
LO2	Create a link with in a webpage.									

LO3	Insert a graphic with in a webpage.	
LO4	Create a table with in a webpage.	
LO5	Insert ordered and unordered lists with in a webpage .Create a webpage	
UNIT	Contents	No. Of. Hours
	<ol style="list-style-type: none"> 1. Write a HTML code to create a web page with any color background and display moving message in any color. 2. Write an HTML code to display your CV on a web page. 3. Write an HTML code to create a Home page for college 4. Write an HTML code to illustrate the usage of the following: <ul style="list-style-type: none"> • Ordered List • Unordered List • Definition List 5. Write an HTML code to create a Home page for college having three links: About Us, Our Department and Contact Us. Create separate web pages for the three links. 6. Write a HTML code to design a Greeting card using image tag. 7. Write a HTML code to display mark sheet using Table tag. 8. Write a HTML code to display using Table and cell alignment attributes. 9. Create a web page which divides the page in two equal frames and place images in frame-1 and frame-2 respectively. 10. Write a HTML program to develop a static Registration Form. 	
TOTAL HOURS		
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Develop working knowledge of HTML	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Ability to Develop and publish Web pages using Hypertext Mark-up Language(HTML).	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Ability to optimize page styles and layout with Cascading Style Sheets(CSS).	PO1, PO2,PO3, PO4,PO5,PO6
CO4	Ability to develop web page using Link	PO1, PO2,PO3, PO4,PO5,PO6
CO5	Ability to develop web page using frame and CSS	PO1, PO2, PO3, PO4,PO5, PO6
1	Text Book Laura Lemay,Rafe Colburn, Jennifer Kyrnin,—Mastering HTML,CSS &Java script Web Publishing,2016.	
2	DTEditorialServices(Author),—HTML5BlackBook(CoversCSS3,JavaScript,XML, XHTML,AJAX,PHP,jQuery),Paperback2016,2ndEdition.	
Reference Book		

1	Acharya, RN[1987] Television in India .Man as Publications, New Delhi.
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II Year BCA

SEMESTER-IV

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total

CC VII	JAVA PROGRAMMING	Core	-	5	-	-	5	5	25	75	100
Course Objectives											
LO1	To provide fundamental knowledge of object-oriented programming										
LO2	To equip the student with programming knowledge in Core Java from the basics up.										
LO3	To enable the students to use AWT controls, Event Handling and Swing for GUI.										
LO4	To provide fundamental knowledge of object-oriented programming.										
LO5	To equip the student with programming knowledge in Core Java from the basics up.										
UNIT	Details										No. of Hours
I	Introduction: Review of Object Oriented concepts-History of Java – Java buzzwords –JVM architecture-Data types-Variables-Scope and life time of variables-Arrays-operators-control statements-type conversion and casting-simple java program-constructors-methods-Static block-Static Data-Static Method String and String Buffer Classes.										15
II	Inheritance: Basic concepts - Types of inheritance -Member access rules- Usage of this and Super keyword-Method Overloading-Method overriding-Abstract classes - Dynamic method dispatch - Usage of final keyword. Packages: Definition-Access Protection-Importing Packages. Interfaces: Definition–Implementation– Extending Interfaces. Exception Handling: <i>try-catch- throw - throws-finally</i> –Built-in exceptions- Creating own Exception classes.										15
III	Multithreaded Programming: Thread Class-Runnable interface– Synchronization–Using synchronized methods– Using synchronized statement-Inter thread Communication–Deadlock. I/O Streams: Concepts of streams- Stream classes-Byte and Character stream Reading console Input and Writing Console output-File Handling.										15

IV	<p>AWT Controls: The AWT class hierarchy-user interface components-Labels-Button-Text Components - Check Box - Check Box Group - Choice -List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Color - Fonts and layout managers.</p> <p>Event Handling: Events-Event sources-Event Listeners - Event Delegation Model (EDM) – Handling Mouse and Keyboard Events - Adapter classes – Inner classes.</p>	15
V	<p>Swing: Introduction to Swing-Hierarchy of swing components. Containers-Top level containers-JFrame-JWindow - JDialog - JPanel - JButton – Jtoggle Button -JCheckBox-JRadioButton-JLabel,JTextField-JTextArea-JList-JComboBox-JScrollPane.</p>	15
	Total	75

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1,PO2,PO6
CO2	Implement inheritance, packages, interfaces and Exception handling of Core Java.	PO2,PO3,PO8
CO3	Implement multi-threading and I/O Streams of Core Java	PO1,PO3,PO7
CO4	Implement AWT and Event handling.	PO2,PO6
CO5	Use Swing to create GUI.	PO1,PO3,PO8
TextBooks:		
1.	Herbert Schildt, The Complete Reference ,Tata McGraw Hill, New Delhi,7thEdition,2010	
2.	Gary Cornell, <i>CoreJava2VolumeI–Fundamentals</i> ,AddisonWesley,1999	
References:		
1.	Head First Java, O’Rielly Publications,	
2.	Y.DanielLiang, <i>IntroductiontoJavaProgramming</i> ,7thEdition, Pearson EducationIndia,2010	
Web Resources		
1.	https://javabeginnerstutorial.com/core-java-tutorial	
2.	http://docs.oracle.com/javase/tutorial/	
3.	https://www.coursera.org/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	2	2	2
CO2	3	1	2	1	2	2
CO3	1	-	2	2	2	2
CO4	2	2	2	2	2	2
CO5	1	2	-	2	2	2
Weightage of course	10	7	6	9	10	10
Contributed to each PSO						

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst .Hours	Marks		
									CIA	External	Total
CC VIII	Java Programming lab	Core	-	-	5	-	5	5	25	75	100
Course Objective											
LO1	To provide fundamental knowledge of object-oriented programming.										
LO2	To equip the student with programming knowledge in Core Java from the basics up.										
LO3	To enable the students to know about Event Handling.										
LO4	To enable the students to use String Concepts.										
LO5	To equip the student with programming knowledge into create GUI using AWT controls.										
UNIT	Details										
1	Write a Java program that prompts the user for an integer and then prints Out all the prime numbers up to that Integer										
2	Write a Java program to multiply two given matrices.										
3	Write a Java program that displays the number of characters, lines and words in a text										
4	Generator and numbers between two given limits using Random class and print messages according to the range of the value generated.										
5	Write a program to do String Manipulation using Character Array and perform the following string operations: a. String length b. Find in a character at a particular position c. Concatenating Two Strings.										
6	Write a program to perform the following string operations using String class:										

	<ul style="list-style-type: none"> a. String Concatenation b. Search a substring c. To extract sub string from given string 	
7	<p>Write a program to perform string operations using StringBufferclass:</p> <ul style="list-style-type: none"> a. Length of a string b. Reverse a string c. Delete a substring from the given string 	
8	<p>Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.</p>	
9	<p>Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread 1and to print 90 to100 usingThread2.</p>	
10	<p>Write a program to demonstrate the use of following exceptions.</p> <ul style="list-style-type: none"> a. Arithmetic Exception b. Number Format Exception c. Array Index Out of Bound Exception d. Negative Array Size Exception 	
11	<p>Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable ,the type and the length of the file in bytes</p>	
Total		
Course Outcomes		Programme Outcome
CO	On completion of this course , students will	
1	<p>Understand the basic Object-oriented concepts.</p> <p>Implement the basic constructs of Core Java.</p>	PO1
2	Implement inheritance, packages, interfaces and	PO1, PO2

	Exception handling of Core Java.	
3	Implement multi-threading and I/O Streams of Core Java	PO4, PO6
4	Implement AWT and Event handling.	PO4,PO5,PO6
5	Use Swing to create GUI.	PO3, PO8
Textbook		
1	Herbert Schildt, The Complete Reference, Tata McGraw-Hill, New Delhi, 7th Edition,2010.	
2.	Gary Cornell, <i>CoreJava2VolumeI– Fundamentals</i> , Addison Wesley, 1999.	
Reference Books		
1.	Head First Java, O' Rielly Publications,	

2.	Y.DanielLiang1, <i>Introduction to Java Programming</i> , 7thEdition, Pearson Education India,2010.
Web Resources	
1.	https://www.w3schools.com/java/
2.	http://java.sun.com
3.	http://www.afu.com/javafaq.html

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	3	2	3
CO2	3	2	1	3	1	3
CO3	3	2	1	3	2	3
CO4	3	2	1	3	2	3
CO5	3	2	1	3	2	3
Weightage of course contributed to each	15	10	5	15	9	15
PSO						

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
	Cost and Management Accounting		-	5	-	-	3	25	75	100
Learning Objectives										
LO1	State the meaning, objective and importance of cost and management accounting θ List the various elements of cost and the way these are classified.									
LO2	Discuss the functions and role of cost accounting department in an organization.									
LO3	Discuss the essentials of cost and management accounting and to know how a system of cost accounting is installed.									
LO4	Differentiate between cost accounting with financial accounting and management accounting.									
LO5	Explain the methods of segregating semi-variable costs into fixed and variable cost.									
UNIT	Contents									No. of Hours
I	Introduction: Introduction of cost accounting - Meaning, definition, scope and objectives of cost accounting, cost accounting Vs financial accounting- Difference between cost accounting and management accounting-Requisites and good costing system-Steps necessary to install a cost system - General principles - Classification methods and techniques of cost accounting									
II	COST SHEET AND RECONCILIATION Elements of cost- Classification of overheads - Cost sheet - cost sheet vs production statement-Stock of Raw materials-specimen cost sheet with inventories -Cost Reconciliation.									
III	MATERIALS Meaning of material control - Essentials, objectives, advantages - Store keeping and inventory control Economic Ordering Quantity (EOQ) - pricing of material issues LIFO - FIFO - HIFO, Simple Average weighted average).									
IV	LABOUR Computation and control of Labour -Labour turnover θ Time keeping department payroll department - Remuneration and incentives-time rate system, piece rate system-premium and Bonus plan.									

V	OVERHEADS Meaning and definition-Importance-Classification- Primary Distribution of overheads Secondary distribution of overheads - calculation of Machine hour rate.	
TOTAL HOURS		
Course Out comes		Programme Outcomes
C O	On completion of this course, students will	
CO1	To learn the theory and practices of cost accounting.	PO1,PO2,PO3,P O4,PO5,PO6
CO2	To understands the concepts of management accounting	PO1,PO2,PO3,P O4,PO5,PO6
CO3	To understand basics of labour ,payroll, enumeration.	PO1,PO2,PO3,P O4,PO5,PO6
CO4	Cost Accounting helps Businesses accurately ascertain Costs.	PO1,PO2,PO3,P O4,PO5,PO6
CO5	Cost accounting enables management to accurately account for costs by factoring in both variable and fixed costs.	PO1,PO2,PO3, PO4,PO5,PO6
Textbooks		
1	RECOMMENDED TEXTS AND REFERENCE: 1. Wheldon A.J., Cost Accounting and Costing Methods. 2. Iyengar S.P., Cost Accounting: Principles and Practice. 3. Bhar B.K., Cost Accounting: Methods and Problems. 4. Bigg W.W., Cost Accounts.	
Reference Books		
1.	Prasad N.K., Cost Accounting: Principles and Problems 8. Robert Anthony: Management Accounting: Text and Cases.	
2.	Jain S.P. and Narang K.L., Advanced Cost Accounting.	
3.	7. Agarwal M., Theory and Practices of Cost Accounting.	
Web Resources		
1.	NPTEL & MOOC courses titled Cost and Management Accounting.	
2.	https://pakaccountants.com/courses/managementaccounting .	
3.	https://www.reed.co.uk/courses/diploma-in-cost-and-management-accounting/238067 .	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	2	2	3	2	3
CO3	3	2	2	3	2	2
CO4	3	2	2	3	2	3
CO5	3	2	2	3	3	3
Weight age of course contributed to each PSO	15	10	10	15	13	14

S-Strong-3 M-Medium-2L-Low-1

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	2	-
CO2	3	2	2	3	3	2
CO3	2	3	3	2	2	3
CO4	2	1	2	2	2	1
CO5	2	2	3	2	2	2
Weightage of course contributed to each PSO	11	10	12	11	11	8

S-Strong-3 M-Medium-2L-Low-1

Course Code: SEC-VI	PHP Programming		Credits: 2
Lecture Hours: (L) per week: 2	Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week: 2
Course Category :SEC	Year & Semester: II Year III Semester	Admission Year:	
Pre-requisite	Basic Knowledge on Web		
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <p>The objective of this course is to teach the fundamentals of quantum information processing, including quantum computation, quantum cryptography, and quantum information theory.</p>			
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1: Analyze the behavior of basic quantum algorithms</p> <p>CO2: Implement simple quantum algorithms and information channels in the quantum circuit model</p> <p>CO3: Simulate a simple quantum error-correcting code</p> <p>CO4: Prove basic facts about quantum information channels</p>			
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>			
Units	Contents		Required Hours
I	Introduction to PHP -Basic Knowledge of websites - Introduction of Dynamic Website -Introduction to PHP - Scope of PHP -XAMPP and WAMP Installation- PHP Programming Basics -Syntax of PHP -Embedding PHP in HTML -Embedding HTML in PHP .		15
II	Introduction to PHP Variable -Understanding Data Types - Using Operators -Using Conditional Statements -If(), else if() and else if condition Statement -Switch() Statements - Using the while() Loop -Using the for() Loop		15

III	PHP Functions -PHP Functions -Creating an Array - Modifying Array Elements -Processing Arrays with Loops -Grouping Form Selections with Arrays -Using Array Functions -Using Predefined PHP Functions -Creating User-Defined Functions	15
IV	PHP Advanced Concepts -Reading and Writing Files - Reading Data from a File .	15
V	Managing Sessions and Using Session Variables - Destroying a Session -Storing Data in Cookies -Setting Cookies	15

Learning Resources:

- **Recommended Texts**

Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison.

- **Reference Books**

The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes

Web resources: Web resources from NDL Library, E-content from open-source libraries

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
SEC- VII	PHP Programming Lab	Specific Elective	-	-	2		2	25	75	100
Learning Objectives										
LO1	The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in PHP.									
UNIT	Contents							No. Of. Hours		
I	<p>1.Create a PHP program to demonstrate the get and post method.</p> <p>2. Create a PHP program to validate the user form.</p> <p>3.Create a PHP program to demonstrate the different predefined function in array.</p> <p>4.Create a PHP program to demonstrate the different predefined function in Math.</p> <p>5.Create a PHP program to demonstrate the different predefined function in Date</p> <p>6. Write a PHP program to store current date-time in a COOKIE and display the “Last visited on” date-time on the web page upon reopening of the same page.</p> <p>7. Write a PHP program to store current date-time in a COOKIE and display the “Last visited</p> <p>8. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively.</p> <p>Write a PHP for doing the following.</p> <p>i). Create a Cookie and add these four user ID’s and passwords to this Cookie.</p> <p>ii). Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.</p> <p>If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display “You are not an authenticated user ”.</p>									
TOTAL HOURS										
Course Outcomes								Programme Outcomes		
CO	On completion of this course, students will									
CO1	Write PHP code to produce outcomes and solve problems.							PO1, PO2, PO3, PO4, PO5, PO6		
CO2	Display and insert data using PHP and MySQL.							PO1, PO2, PO3, PO4, PO5, PO6		

CO3	Test, debug, and deploy web pages containing PHP and MySQL.	PO1, PO2,PO3, PO4,PO5,PO6
	Text Book	
	Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison.	
	Reference Book	
	The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes	

THIRD YEAR

SEMESTER-V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC IX	Operating Systems	Core	-	5	-	-	4	5	25	75	100
Course Objective											
LO1	Understanding the design of the Operating System										
LO2	Imparting knowledge on CPU scheduling, Process and Memory Management.										
LO3	To code specialized programs form an aging over all resources and operations of the computer.										
LO4	To study about the concept of processor scheduling										
LO5	To learn about the concept of memory organization and multi programming										
UNIT	Details										No. of Hours
	<p>Introduction: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation.</p> <p>Process concepts: definition of process, process states-Life cycle of a process, process management-process state transitions, process control block (PCB), process operations , suspend and resume, context switching, Interrupts-Interrupt processing, interrupt classes, Inter process communication-signals, message passing.</p>										12
II	<p>Asynchronous concurrent processes: mutual exclusion- critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson’s algorithm, software solutions to the mutual Exclusion Problem-,n-thread mutual exclusion-Lamport’s Bakery-Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, Counting semaphores, implementing semaphores.</p> <p>Concurrent programming: monitors, message passing</p>										12

III	Deadlock and indefinite postponement: Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery.	12
IV	Job and processor scheduling : scheduling levels ,scheduling objectives, scheduling criteria, preemptive vs. non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms-FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRRN scheduling, multilevel feedback queues, Fair share scheduling.	12
V	Real Memory organization and Management: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition multi programming, variable partition multi programming, Memory swapping. Virtual Memory organization: virtual memory basic concepts, multi-level storage organization, block mapping, paging basic concepts, segmentation, and paging/segmentation systems. Virtual Memory Management: Demand Paging, Page replacement strategies	12
Total		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Define the fundamentals of OS and identify the concepts relevant to process, process life cycle, Scheduling Algorithms, Deadlock and Memory management.	PO1
2	Know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1, PO2
3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock.	PO4, PO6
4	Have complete knowledge of Scheduling Algorithms and its types.	PO4, PO5, PO6
5	Understand memory organization and management	PO3, PO8
Textbook		
1	H.M.Deitel,OperatingSystems,ThirdEdition,PearsonEducationAsia,2011	
Reference Books		
1.	William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.	
2.	A. Silberschatz, and P.B. Galvin., Operating Systems Concepts, Ninth Edition, John Wiley Sons(ASIA)PteLtd.,2012	

Web Resources	
1.	
2.	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	1	2	-	1
CO2	2	3	1	2	-	1
CO3	3	2	-	3	-	1
CO4	1	3	1	1	3	2
CO5	3	-	1	3	2	1
Weightage of course contributed to each PSO	12	8	4	11	5	6

S-Strong-3 M-Medium-2L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-X	Database Management System	Core	-	5	-	-	4	5	25	75	100
Course Objective											
LO1	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.										
LO2	To understand the concepts of data base management system, design simple Database models										
LO3	To learn and understand to write queries using SQL, PL/SQL.										
LO4	Students can learn various SQL and PL/SQL commands,										
LO5	Students can learn cursor and various application programs.										
UNIT	Details									No.of Hours	
I	Database Concepts: Database Systems - Data vs Information - Introducing the database -File system - Problems with file system – Database systems. Data models - Importance - Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction									12	
II	Design Concepts: Relational database model - logical view of data-keys - Integrity rules - relational set operators - data dictionary and the system catalog - relationships -data redundancy revisited -indexes - codd's rules. Entity relationship model - ER diagram									12	
III	Normalization of Database Tables: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form. Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.									12	

IV	Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS.SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function	12
V	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation –Arithmetic operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	12

	Total	60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	PO1
2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	PO1,PO2
3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML).	PO4,PO6
4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4,PO5,PO6
5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO3,PO8
Textbook		
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016.	
Reference Books		
1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,“ Database System Concepts”, McGraw Hill International Publication ,VI Edition.	
2.	Shio Kumar Singh , “Database Systems “,Pearson publications , II Edition	
Web Resources		
1.	Web resources from NDL Library, E-content from open-source libraries	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	1	2	-	1
CO2	2	3	1	2	-	1
CO3	3	2	-	3	-	1
CO4	1	3	1	1	3	2
CO5	3	-	1	3	2	1
Weightage of course contributed to each PSO	12	8	4	11	5	6

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-XI	Operating System Lab	Core		-	5	-	4	5	25	75	100
Course Objective											
LO1	Understanding the UNIX ENVIRONMENT										
LO2	Imparting knowledge on SHELL script.										
LO3	To code specialized programs for managing overall resources and operations of the computer.										
	List of Exercises:						Required Hours				
	<p>1) Write a program to count the number of characters in a given string.</p> <p>2) Write a program to find whether the given year is leap year or not?</p> <p>3) Write a program to check whether a given number is even or odd.</p> <p>4) Write a program to find factorial of a given number.</p> <p>5) Write a program to print all prime numbers between m and n(m<n).</p> <p>6) Write a shell Script to assign a file permission to the given file using</p> <p>7) Program for Pattern matching using grep command</p> <p>8) To compresses a file using gzip and pack commands.</p>										

	<p>9) Write a menu driven shell script to implement the following Unix/linux commands. a.ps b.pwd c.date d.who e.who am i</p> <p>10) To find a given pattern in a list of files of current directory using grep and fgrep commands.</p> <p>11) Write a shell script to create two directories and store five files in one directory using the related commands and to transfer all the files to another directory.</p> <p>12) Write a shell script to accept a file name as input and display whether it exists or not. If it exists, then give the details of its attributes like access permission ,its size etc.</p>	
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Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks			
									CIA	External	Total	
CC-XII	Database Management Lab	Core		-	5	-	4	5	25	75	100	
Course Objective												
LO1	Ability to formulate queries using DML, DDL and DCL.											
LO2	To learn and understand to write queries using SQL, PL/SQL.											
LO3	Students can learn various SQL and PL/SQL commands,											
LO4	Students can learn cursor and various application programs.											
	List of Exercises:							Required Hours				
I	<i>SQL</i> 1. DDL COMMANDS 2. DML COMMANDS 3. TCL COMMANDS											
II	<i>PL/SQL</i> 4. FIBONACCI SERIES 5. FACTORIAL 6. STRING REVERSE 7. SUM OF SERIES 8. TRIGGER											
III	CURSOR 9. STUDENT MARK ANALYSIS USING CURSOR											
IV	APPLICATION 10. LIBRARY MANAGEMENT SYSTEM											

	11. <i>STUDENT MARK ANALYSIS</i>	
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Total		
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	
2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	
3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML).	
4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	
5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	
Recommended Texts		
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016	
Reference Books		
1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", McGraw Hill International Publication ,VI Edition.	
2.	Shio Kumar Singh , "Database Systems ", Pearson publications ,II Edition	
Web resources		
1.	Web resources from NDL Library, E-content from open-source libraries.	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	1	2	-	1
CO2	2	3	1	2	-	1
CO3	3	2	-	3	-	1
CO4	1	3	1	1	3	2
CO5	3	-	1	3	2	1
Weightage of course contributed to each PSO	12	8	4	11	5	6

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
DSE-I	Introduction to Data Science		-	5	-	-	3	5	25	75	100
Course Objective											
LO1	To learn about basics of Data Science and Big data.										
LO2	To learn about over view and building process of Data Science.										
LO3	To learn about various Algorithms in Data Science.										
LO4	To learn about Hadoop Framework.										
LO5	To learn about case study about Data Science.										
UNIT	Details										No. of Hours
I	Introduction: Benefits and uses–Facts of data–Data science process–Big data eco system and data science										9
II	The Data science process: Overview– research goals-retrieving data-Transformation–Exploratory Data Analysis–Model building.										9
III	Algorithms : Machine learning algorithms–Modeling process–Types –Supervised– Unsupervised-Semi-supervised										9
IV	Introduction to Hadoop: Hadoop framework–Spark–replacing Map Reduce–No SQL–ACID–CAP–BASE–types										9
V	Case Study: Prediction of Disease-Setting search goals- Data retrieval–preparation-exploration-Disease profiling-presentation and automation										9
Total										45	
Course Outcomes								Programme Outcome			
CO	On completion of this course, students will										
1	Understand the basics in Data Science and Big data.							PO1			
2	Understand overview and building process in Data Science.							PO1, PO2			
3	Understand various Algorithms in Data Science.							PO4, PO6			
4	Understand Hadoop Framework in Data Science.							PO4, PO5, PO6			
5	Case study in Data Science.							PO3,PO8			
Text Book											
1	Davy Cielen, Arno D.B.Meysman, Mohamed Ali,–Introducing Data Sciencell, Manning publications2016										

Reference Books	
1.	Roger Peng , -The Art of Data Science, lulu.com 2016.
2.	Murtaza Haider, -Getting Started with Data Science - Making Sense of Data with Analytics , IBM press, E-book.
3.	Davy Cielen, Arno D.B. Meysman, Mohamed Ali, -Introducing Data Science : Big Data, Machine Learning, and More, Using Python Tools, Dreamtech Press 2016.
4.	Annalyn Ng, Kenneth Soo, -Numsense! Data Science for the Layman: No Math Added, 2017, 1st Edition.
5.	Cathy O'Neil, Rachel Schutt, -Doing Data Science Straight Talk from the Frontline, O'Reilly Media 2013.
6.	Lillian Pierson, -Data Science for Dummies, 2017 II Edition
Web Resources	
1.	https://www.w3schools.com/datascience/
2.	https://en.wikipedia.org/wiki/Data_science
3.	http://www.cmap.polytechnique.fr/~lepenec/en/post/references/refs/

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	-
CO2	2	3	2	2	-	1
CO3	3	2	2	1	1	3
CO4	1	2	2	1	3	1
CO5	2	2	-	3	1	1
Weightage of course Contributed to each PSO	11	11	7	9	7	6

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
DSE-II	Multimedia System	Core	-	5	-	-	3	5	25	75	100
Course Objective											
LO1	Identify and describe the function of the general skill sets in the multimedia industry. □										
LO2	Identify the basic components of a multimedia project.										
LO3	Identify the basic hardware and software requirements for multimedia development and playback.										
LO4	ware of the rapid rate of change of technology and methodologies in the multimedia environment										
LO5	A. Demonstrate an advanced knowledge of photo editing including: image manipulation, color correction, compositing, toning, and preparing for distribution.										
UNIT	Details									No. of Hours	
I	Introductory Concepts: Multimedia – Definitions, CD-ROM and the Multimedia Highway, Uses of Multimedia, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia,									9	
II	UNIT-II Multimedia-Hardware and Software: Multimedia Hardware – Macintosh and Windows production Platforms, Hardware peripherals – Connections, Memory And storage devices,									9	

III	Multimedia – making it work – multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression:	9
IV	Multimedia and the Internet: History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW – Web Servers, Web Browsers, Web page makers and editors,	9
V	Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing,	9

	Total	45
	Course Outcomes	Programme Outcomes
CO	On completion of this course, students will	
1	Identify and describe the function of the general skill sets in the multimedia industry.	PO1
2	Identify the basic components of a multimedia project	PO1,PO2
3	Identify the basic hardware and software requirements for multimedia development and playback.	PO4,PO6
4	Aware of the rapid rate of change of technology and methodologies in the multimedia environment.	PO4,PO5,PO6
5	Demonstrate an advanced knowledge of photo editing including: image manipulation, color correction, compositing, toning, and preparing for distribution.	PO3,PO8
Textbook		

	<p>TEXT BOOKS: 1. S. Heath, Multimedia & Communication Systems, Focal Press, UK.</p> <p>2. T. Vaughan, Multimedia: Making it work, 4th Edition, Tata McGraw Hill, New Delhi.</p> <p>3. K. Andleigh and K. Thakkar, Multimedia System Design, PHI, New Delhi.</p>
Reference Books	
1.	<p>1. Keyes, “Multimedia Handbook”, TMH.</p> <p>2. R. Steinmetz and K. Naharstedt, Multimedia: Computing, Communications & Applications, Pearson, Delhi.</p> <p>3. S. Rimmer, Advanced Multimedia Programming, PHI, New Delhi.</p>
Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	1	2	-	1
CO2	2	3	1	2	-	1
CO3	3	2	-	3	-	1
CO4	1	3	1	1	3	2
CO5	3	-	1	3	2	1
Weightage of course contributed to each PSO	12	8	4	11	5	6

S-Strong-3 M-Medium-2 L-Low-1

SEMESTER-VI

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst .Hours	Marks		
									CIA	External	Total
CC-XIII	R Programming	Core	-	5	-	-	4	5	25	75	100
Course Objective											
LO1	To understand the problem solving approaches										
LO2	To learn the basic programming constructs in R Programming										
LO3	To learn the basic programming constructs in R Programming										
LO4	To use R Programming data structures-lists, tuples, and dictionaries.										
LO5	To do input/output with files in R Programming.										
UNIT	Details										No. of Hours
I	Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating —The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications —Perception and Quantification of Value – Understanding Big Data Storage										12
II	CONTROL STRUCTURES AND VECTORS – Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Indexing,										12

	Common Vector Operations.	
III	LISTS- Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations	12
IV	FACTORSANDTABLES-Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix / Array-Like Operations on Tables, Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions RPROGRAMMING.	12
V	OBJECT-ORIENTED PROGRAMMINGS Classes, SGeneric Functions, Writing SClasses, Using Inheritance, SClasses, Writing SClasses, Implementing a Generic Function on an SClass, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation	12
Total		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1,PO2
3	Learnandapplydifferentminingalgorithmsandrecommendationsystemsforlargevolumesofdata.	PO4,PO6
4	Perform analytics on data streams.	PO4,PO5,PO6
5	Learn NoSQL databases and management.	PO3,PO8
Text Book		
1	RogerD.Peng, RProgrammingforDataScience-, 2012	
2	Norman Matloff, The Artof R Programming-A Tour of Statistical Software Design , 2011	
Reference Books		
1.	1. Garrett Golemund, Hadley Wickham, Hands On Programming with R: Write Your Own Functions and Simulations , 1stEdition,2014	
2.	Venables, W. N., and Ripley, Sprogramming-,Springer,2000.	
Web Resources		
1.	https://www.simplilearn.com	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	3	1	-
CO2	3	3	2	2	-	2
CO3	1	2	3	1	2	1
CO4	2	2	1	-	2	1
CO5	2	2	2	1	3	1
Weightage of course	11	11	8	7	8	5
Contributed to each PSO						

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst .Hours	M a r k s		
									CIA	External	Total
CC-XIV	Data communication and Networking	Core	-	5	-	-	4	5	25	75	100
Course Objective											
LO1	To understand the concept of Data communication and Computer network										
LO2	To get a knowledge on routing algorithms.										
LO3	To impart knowledge about networking and inter networking devices										
LO4	To gain the knowledge on Protocol over Network communication										
LO5	To gain the knowledge on Security over Network communication										
Unit	Details	NO of Hours									
I	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media	12									
II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	12									
III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth	12									
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	12									
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP)	12									
Total		60									

Course Outcomes		Programme Outcome
CO		
1	On completion of this course, students will To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models	PO1,PO4,PO5
2	To gain knowledge on Telephone systems and Satellite communications	PO1,PO4,PO8
3	To impart the concept of Elementary data link protocols	PO1,PO3,PO6
4	To analyze the characteristics of Routing and Congestion control algorithms	PO3,PO4
5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS	PO1,PO5,PO6
Text Book		
1	A. S. Tanenbaum, “Computer Networks”, 4th Edition, Prentice-Hall of India, 2008.	
Reference Books		
1	B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition, 2017.	
2.	F. Halsall, “Data Communications, Computer Networks and Open Systems”, Pearson Education, 2008.	
Web Resources		
1.	Web resources from NDL Library, E-content from open-source libraries	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	1	2
CO2	2	3	3	3	1	2
CO3	2	3	3	3	1	2
CO4	2	3	3	3	1	2
CO5	2	3	3	3	1	2
Weight age of Course contributed to each PSO	11	15	15	15	5	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst .Hours	M a r k s		
									CIA	External	Total
CC-XV	R Programming-LAB	Core	-	-	5	-	4	5	25	75	100
Course Objective											
LO1	To understand the problem solving approaches										
LO2	To learn the basic programming constructs in R Programming										
LO3	To practice various computing strategies for R Programming based solutions to real world problems.										
LO4	To use R Programming data structures-lists, tuples, and dictionaries.										
LO5	To do input/output with files in R Programming.										
Sl.No	Details										
1.	Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending Up on user's choice.										
2.	Program to find the area of rectangle, square, circle and triangle by accepting suitable input Parameters from user.										
3.	Write a program to find list of even numbers from 1 to n using R-Loops.										
4.	Create a function to print squares of numbers in sequence.										
5.	Write a program to join columns and rows in a data frame using cbind () and rbind() in R.										
6.	Implement different String Manipulation function in R.										
7.	Implement different data structures in R(Vectors, Lists, Data Frames)										

8	Write a program to read a CSV file and analyze the data in the file in R.	
9	Create pie chart and bar chart using R.	
10	Create a dataset and do statistical analyses is on the data using R.	
11	Program to find factorial of the given number using recursive function	
12	Write an R program to count the number of even and odd numbers from array of Numbers.	
Total		
Course Outcomes		Programme Outcome
1	On completion of this course, students will Acquire programming skills in core R Programming	PO1,PO4,PO5
2	Acquire Object- oriented programming skills In R Programming.	PO1,PO4,PO8
3	Develop the skill of designing graphical-user Interfaces (GUI) in R Programming	PO1,PO3,PO6
4	Acquire R Programming skills to move into Specific branches	PO3,PO4
5		PO1,PO5,PO6
Text Book		
1	Roger D .Peng, R Programming for DataScience–,2012	
2	Norman Matloff, The Art of R Programming-A Tour of Statistical Software Design, 2011	
Reference Books		
1	Garrett Golemund, Hadley Wickham, Hands –On Programming with R:Write Your Own Functions and Simulations,1stEdition,2014	
2.	Venables, W.N, and Ripley, S programming ,Springer,2000.	
Web Resources		
1.	https://www.simplilearn.com	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	1	2
CO2	2	3	3	3	1	2
CO3	2	3	3	3	1	2
CO4	2	3	3	3	1	2
CO5	2	3	3	3	1	2
Weightage of course contributed to each PSO	11	15	15	15	5	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst .Hours	M	a r k s	
										CIA	Externa l
DSE-III	MINI PROJECT Lab	Core	-	-	5	-	3	5	25	75	100

Course Code: DSE-IV	Software Engineering		Credits: 3
Lecture Hours: (L) per week: 5	Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week: 5
Pre-requisite	Basic Knowledge on Software Applications		
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field) To understand the software engineering concepts and to create a system model in real life applications</p>			
<p>Course Outcomes: (for students: To know what they are going to learn) CO1: Gain basic knowledge of analysis and design of systems CO2: Ability to apply software engineering principles and techniques CO3: Model a reliable and cost-effective software system CO4: Ability to design an effective model of the system CO5: Perform Testing at various levels and produce an efficient system.</p>			
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>			
Units	Contents	Required Hours	
I	<p>Introduction: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Notable changes in software development practices, computer systems engineering.</p> <p>Software Life Cycle Models: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.</p>	9	

II	<p>Requirements Analysis and Specification: Requirements gathering and analysis, Software requirements specification (SRS)</p> <p>Software Design: Good software design, cohesion and coupling, neat arrangement, software design approaches, object-oriented vs function-oriented design</p>	9
III	<p>Function-Oriented Software Design: Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design.</p> <p>User-Interface design: Characteristics of a good interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.</p>	9
IV	<p>Coding and Testing: Coding; code review; testing; testing in the large vs testing in the small; unit testing; black-box testing; white-box testing; debugging; program analysis tools; integration testing; system testing; some general issues associated with testing.</p> <p>Software Reliability and Quality Management: Software reliability; statistical testing; software quality; software quality management system; SEI capability maturity model; personal software process.</p>	9
V	<p>Computer Aided Software Engineering: CASE and its scope; CASE environment; CASE support in software life cycle; other characteristics of CASE tools; towards second generation CASE tool; architecture of a CASE environment.</p> <p>Software Maintenance: Characteristic of software maintenance; software reverse engineering; software maintenance process models; estimation of maintenance cost;</p>	9
Extended Professional Component (is a part of	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>	

internal component only, Not to be included in the External Examination question paper)		
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	
<p>Learning Resources:</p> <ul style="list-style-type: none"> ● Recommended Texts <ol style="list-style-type: none"> 1. Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018 ● Reference Books <ol style="list-style-type: none"> 1. Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997. 2. Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill. James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions. <p>Web resources: Web resources from NDL Library, E-content from open-source libraries</p>		

Course Code: Professional Competency Skill Cloud computing	Cloud Computing		Credits: 2
Lecture Hours: (L) per week	Tutorial Hours : (T) per week	Lab Practice Hours: (P)per week	Total: (L+T+P) per week: 2
Course Category :	Year & Semester: III Year VI Semester	Admission Year:	
Pre-requisite	Basic knowledge on virtual storage or cloud concept		
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> ● To impart fundamental concepts of Cloud Computing. ● To impart a working knowledge of the various cloud service types and their uses and pitfalls. ● To enable the students to know the common features and differences in the service offerings of the three major Cloud Computing service providers, namely Amazon, Microsoft and Google. ● To provide know-how of the various aspects of application design, benchmarking and security on the Cloud. 			
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1: To understand the concepts and technologies involved in Cloud Computing.</p> <p>CO2: To understand the concepts of various cloud services and their implementation in the Amazon, Microsoft and Google cloud computing platforms.</p> <p>CO3: To understand the aspects of application design for the Cloud.</p> <p>CO4: To understand the concepts involved in benchmarking and security on the Cloud.</p> <p>CO5: To understand the way in which the cloud is used in various domains.</p>			
Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)			
Units	Contents	Required Hours	
I	<p>Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications.</p> <p>Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – MapReduce – Identity and Access Management – Service Level Agreements – Billing.</p>	6	
II	<p>Cloud Services</p> <p>Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines. Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage</p>	6	

	<p>Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service</p> <p>Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services</p> <p>Content Delivery Services: Amazon CloudFront - Windows Azure Content Delivery Network</p> <p>Analytics Services: Amazon Elastic MapReduce - Google MapReduce Service - Google BigQuery - Windows Azure HDInsight</p> <p>Deployment and Management Services: Amazon Elastic Beanstalk - Amazon CloudFormation</p> <p>Identity and Access Management Services: Amazon Identity and Access Management - Windows Azure Active Directory</p> <p>Open Source Private Cloud Software: CloudStack – Eucalyptus - OpenStack</p>	
III	<p>Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design</p> <p>Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).</p>	6
IV	<p>Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping.</p> <p>Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security : Securing data at rest, securing data in motion – Key Management – Auditing.</p>	6
V	<p>Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.</p>	6

<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>	
<p>Learning Resources:</p> <ul style="list-style-type: none"> ● Recommended Texts <ol style="list-style-type: none"> 1. Arshdeep Bahga, Vijay Madiseti, <i>Cloud Computing – A Hands On Approach</i>, Universities Press (India) Pvt. Ltd., 2018. ● Reference Books <ol style="list-style-type: none"> 1. Anthony T Velte, Toby J Velte, Robert Elsenpeter, <i>Cloud Computing: A Practical Approach</i>, Tata McGraw-Hill, 2013. 2. Barrie Sosinsky, <i>Cloud Computing Bible</i>, Wiley India Pvt. Ltd., 2013. 3. David Crookes, <i>Cloud Computing in Easy Steps</i>, Tata McGraw Hill, 2012. 4. Dr. Kumar Saurabh, <i>Cloud Computing</i>, Wiley India, Second Edition 2012. <p>Web resources: Web resources from NDL Library, E-content from open-source libraries</p>		

PART V = Extension Activity