M. C. A.
(COMPUTER APPLICATIONS)

SYLLABUS - 2017

SCHOOLS OF EXCELLENCE
with
CHOICE BASED CREDIT SYSTEM (CBCS)

SCHOOL OF COMPUTING SCIENCES
St. JOSEPH'S COLLEGE (Autonomous)
Special Heritage Status Awarded by UGC
Accredited at 'A' Grade (3rd cycle) by NAAC
College with Potential for Excellence Conferred by UGC
DBT-STAR & DST-FIST Sponsored College
TIRUCHIRAPPALLI - 620 002, INDIA

SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS)

POSTGRADUATE COURSES

St. Joseph's College (Autonomous), a pioneer in higher education in India, strives to work towards the academic excellence. In this regard, it has initiated the implementation of five "Schools of Excellence" from the academic year 2014-15, to standup to the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system allows the enhanced academic mobility and enriched employability of the students. At the same time this system preserves the identity, autonomy and uniqueness of every department and reinforces their efforts to be student centric in curriculum designing and skill imparting. These five schools will work concertedly to achieve and accomplish the following objectives.

- Optimal utilization of resources both human and material for the academic flexibility leading to excellence.
- Students experience or enjoy their choice of courses and credits for their horizontal mobility.
- The existing curricular structure as specified by TANSCHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice-based credit system.
- Human excellence in specialized areas
- Thrust in internship and / or projects as a lead towards research and
- The multi-discipline nature of the newly evolved structure (School System) caters to the needs of stake-holders, especially the employers.

What is Credit system?

Weightage to a course is given in relation to the hours assigned for the course. Generally, one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours. The following Table shows the correlation between credits and hours. However, there could be some flexibility because of practical, field visits, tutorials and nature of project work.

For PG courses, a student must earn a minimum of 110 credits as mentioned in the table below. The total number of minimum courses offered by a department are given in the course pattern.

POSTGRADUATE COURSE PATTERN (June 2018 onwards)

Part	Semester	Specification	No. of Courses	Hours	Credits	Total Credits
1	I-IV	**Core Courses** Theory Practical	 12-14 3-6	84	68	81
	II	**Self-Paced Learning**	1	-	2	
	III	**Interdisciplinary Core**	1	6	5	
	IV	**Comprehensive Examination** **Project Work**	1 1	- 6	2 4	
2	I-III	**Core Electives**	3	12	12	12
3	II	**IDC (Soft Skills)**	1	4	4	**12**
	III	**IDC (WS)** **IDC (BS)**	1 1	4 4	4 4	
4	I	**Extra Credit Courses-1 (MOOC)**	1	-	(2)	(4)
	III	**Extra Credit Courses-2 (MOOC)**	1	-	(2)	
5	IV	Outreach Programme (SHEPHERD)	1	-	5	**5**
		TOTAL		**120**		**110 (+4 extra credits)**

Note: IDC: Inter-Departmental Courses, BS: Between School, WS: Within School

However, there could be some flexibility because of practical, field visits, tutorials and nature of project work. For PG courses, a student must earn a minimum of 110 credits. The total number of courses offered by a department is given above.

Course Pattern

The Post-Graduate degree course consists of five vital components. They are core course, core electives, IDCs, Extra credit courses, and the Outreach Programme.

Core Courses

A core course is the course offered by the parent department related to the major subjects, components like theories, practicals, Inter disciplinary core, self paced learning, comprehensive examination, Project work, field visits, library record and etc.

Inter-disciplinary Core

Inter-disciplinary Core should be shared by the various Departments of every School. This course should be opted by all the students belonging to the particular school. Each department of the respective school should allocate themselves the schedule and the units of the course.

Core Elective

The core elective course is also offered by the parent department. The objective is to provide choice and flexibility within the department. There are three core electives. They are offered in different semesters according to the choice of the school.

Extra Credit Courses

In order to facilitate the students gaining extra credits, the extra credit courses are given. According to the guidelines of UGC, the students are encouraged to avail this option of enriching by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

Inter-Departmental Courses (IDC)

IDC is an interdepartmental course offered by a department / School for the students belonging to other departments / school. The objective is to provide mobility and flexibility outside the parent department / School. This is introduced to make every course multi-disciplinary in nature. It is to be chosen from a list of courses offered by various departments.

There are three IDCs. Among three, one is the Soft-Skill course offered by the JASS in the II Semester for the students of all the Departments. The other one is offered "With-in the school" (WS) and the third one is offered "Between the school" (BS). The IDCs are of application oriented and inter disciplinary in nature.

Subject Code Fixation

The following code system (9 characters) is adopted for Post Graduate courses:

Year of Revision	PG Code of the Dept	Semester	Specification of Part	Running number in the part
↓	↓	↓	↓	↓
17	P##	*x*	*x*	*xx*
17	**PCA**	**1**	**1**	**01**

For Example :

I MCA, first semester **'UNIX' and 'C' Programming**

The code of the paper is **17PCA1101**.

Thus, the subject code is fixed for other subjects.

Specification of the Part

I - Core Courses: (Theory, Practical, Self paced Learning, Inter-disciplinary Core, Core, Comprehensive Examination, Project work)
II - Core Electives
III - Inter Departmental Courses (WS, Soft Skill & BS)
IV - Extra credit courses
V - Outreach Programme (Shepherd)

EXAMINATION

Continuous Internal Assessment (CIA):

PG - Distribution of CIA Marks	
Passing Minimum: 50 Marks	
Library Referencing	5
3 Components	35
Mid-Semester Test	30
End-Semester Test	30
CIA	**100**

Mid-Semster & End-Semester Tests

Centralised – Conducted by the office of Controller of Examinations

1. Mid-Semester Test & End-Semester Test: (2 Hours each); will have Objective + Descriptive elements; with the existing question pattern PART-A; PART-B; and PART-C
2. CIA Component III for UG & PG will be of 15 marks and compulsorily objective multiple choice question type.
3. The CIA Component III must be conducted by the department / faculty concerned at a suitable computer centres.
4. The 10 marks of PART-A of Mid-Semester and End-Semester Tests will comprise only: OBJECTIVE MULTIPLE CHOICE QUESTIONS; TRUE / FALSE; and FILL-IN BLANKS.
5. The number of hours for the 5 marks allotted for Library Referencing/ work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses (Courses) of the Semester.
6. English Composition once a fortnight will form one of the components for UG General English

SEMESTER EXAMINATION

Testing with Objective and Descriptive questions

Part-A: Objective MCQs only (30 Marks)

Answers are to be marked on OMR score-sheet. The OMR score-sheets will be supplied along with the Main Answer Book. 40 minutes after the start of the examination the OMR score-sheets will be collected

Part-B & C: Descriptive (70 Marks)

Part-B: 5 x 5 = 25 marks; inbuilt choice;

Part-C: 3 x 15 = 45 marks; 3 out of 5 questions, open choice.

The Accounts Paper of Commerce will have

Part-A: Objective = 25 marks

Part-B: 25 x 3 = 75 marks

Duration of Examination must be rational; proportional to teaching hours 90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

GRADING SYSTEM

1. Grading

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added. The marks thus obtained, will then be graded as per the scheme provided in the following Table-1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by Semester **Grade Point Average (GPA)** and **Cumulative Grade Point Average (CGPA)** respectively. These two are calculated by the following formulae:

GPA = $\frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$ **WAM** (Weighted Averag Marks) = $\frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$

where,

'C_i' is the Credit earned for the Course-*i,*
'G_i' is the Grade Point obtained by the student for the Course '*i*',
'M' is the marks obtained for the course '*i*', and
'*n*' is the number of Courses **Passed** in that semester.

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

2. Classification of Final Results

i) The classification of final results shall be based on the CGPA, as indicated in the following Table-2.

ii) For the purpose of Classification of Final Results, the candidates who earn the CGPA 9.00 and above shall be declared to have qualified for the Degree as 'Outstanding'. Similarly, the candidates who earn the CGPA between 8.00 and 8.99, 7.00 and 7.99, 6.00 and 6.99, and 5.00 and 5.99 shall be declared to have qualified for their Degree in the respective programmes as 'Excellent', 'Very Good', 'Good', and 'Above Average' respectively.

iii) Absence from an examination shall not be taken as an attempt.

Table-1: Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above but below 90	9	A+
70 and above but below 80	8	A
60 and above but below 70	7	B+
50 and above but below 60	6	B
Below 50	NA	RA

Table-2: Final Result

CGPA	Classification of Final Results	Corresponding Grade
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
Below 5.00	RA	Re-appearance

Credit based weighted Mark System is to be adopted for individual semesters and cumulative semesters in the column 'Marks Secured' (for 100).
A Pass in Outreach Programme (SHEPHERD) will continue to be mandatory although the marks will not count for the calculation of the CGPA.

Declaration of Result:

Mr./Ms. _____ has successfully completed the Post Graduate in _____ programme. The candidate's Cumulative Grade Point Average (CGPA) is _____ and the class secured _____ by completing the minimum of 110 credits.
The candidate has also acquired _____ (if any) extra credits offered by the parent department courses.

Master of Computer Applications (MCA)
Course Pattern - 2017 Set

Sem.	Code	Course	Hr	Cr
I	17PCA1101	Unix and C Programming	6	5
	17PCA1102	Mathematical Foundations	6	5
	17PCA1103	Organisational Behaviour	6	4
	17PCA1104	Digital Computer Fundamentals	6	5
	17PCA1105	Software Lab–I: C Programming	3	2
	17PCA1106	Software Lab–II: Multimedia	3	2
	17PCA1107	Self-paced Learning: Fundamentals of IT	-	2
		Total for Semester I	**30**	**25**
II	17PCA2108	Object Oriented Concepts and C++	4	3
	17PCA2109	Operating Systems	4	3
	17PCA2110	Probability and Statistics	4	4
	17PCA2111	Software Lab–III: C++	3	2
	17PCA2112	Software Lab–IV: Unix and Shell Programming	3	2
	17PCA2201A	Core Elective I: Python (or)	4	4
	17PCA2201B	Core Elective I: Computer Simulation		
	17PSS2301	IDC: Soft Skills	4	4
	17PCA2301A	IDC (WS): Data Analysis using R Language	4	4
	16PMA2301B	IDC (WS): MATLAB		
		Total for Semester II	**30**	**26**
III	17PCA3113	Programming in Java	4	3
	17PCA3114	Database Systems	4	3
	17SCS3101	Design and Analysis of Algorithms	4	3
	17PCA3115	Software Lab – V: JAVA	3	2
	17PCA3116	Software Lab–VI: RDBMS	3	2
	17PCA3202A	Core Elective II: Computer Organization and Architecture (or)	4	4
	17PCA3202B	Core Elective II: Enterprise Resource Planning		
	17PCA3402	IDC (BS): Web Design	4	4
	17PCA3117	Online Course - I: Quantitative Aptitude*	4	2
		Total for Semester III	**30**	**23**

Sem.	Code	Course	Hr	Cr
IV	17PCA4118	Programming Smart Devices	5	4
	17PCA4119	Accounting and Financial Management	5	4
	17PCA4120	Graph and Automata Theory	5	4
	17PCA4121	Computer Networks and Security	5	3
	17PCA4122	Software Lab–VII: XML & Android	3	2
	17PCA4123	Software Lab–VIII: PHP & MySQL	3	2
	17PCA4203A	Core Elective III: Data Mining Techniques (or)	4	4
	17PCA4203B	Core Elective III: Information Storage and Management		
	17PCA4203C	Core Elective III: Linux Administration		
	17PCA4124	Domain Study**	-	2
		Total for Semester IV	**30**	**25**
V	17PCA5125	Distributed Technologies	4	3
	17PCA5126	Software Engineering	4	3
	17PCA5127	Big data and Cloud Computing	4	3
	17PCA5128	Operations Research	4	3
	17PCA5129	Compiler Design	4	3
	17PCA5130	Software Lab–IX: Distributed Programming	3	2
	17PCA5131	Software Lab–X: R Programming	3	2
	17PCA5132	Comprehensive Examination	-	2
	17PCA5133	Mini Project**	-	3
	17PCA5134	Online Course -II: Interview Preparation & Managerial Skills	4	2
		Total for Semester V	**30**	**26**
VI	17PCA6135	Project	30	20
		Total for Semester VI	**30**	**20**
I-V	17PCW6501	Outreach Programme (SHEPHERD)	-	5
		Total for all Semesters	**180**	**150**

* Internal Papers

** Examination / Viva at the end of the year

Semester I **Hours/Week: 6**
17PCA1101 **Credits : 5**

UNIX & C PROGRAMMING

Course Outcomes

Upon successful completion of this course, students will be able

1. To understand the structure and commands of UNIX operating system.
2. To know basic UNIX commands.
3. To handle various data types in a programming.
4. To know the flow of the various control structures.
5. To familiar with function calling mechanism.
6. To transform a problem into involving programming constructs.
7. To write programs using structures, strings, arrays and pointers.
8. To write file handling programs.

Unit-I: **(18)**

Structure of UNIX - UNIX file system - Types of users, files and permission - Structure of Password file - Directories and Path name - Basic directory Commands - standard I/O files - redirecting standard I/O files - Pipelines and filters.

Unit-II: **(18)**

Data Types - Variables - Operators - Control structures - Looping structures - Arrays –Strings.

Unit-III: **(18)**

Functions - Built-in-functions - Types of functions - Scope of Variables - Call by value and Call by reference.

Unit-IV: **(18)**

Pointers- Pointer and Arrays- Array of Pointers- Pointer as Function Arguments-Functions returning pointers-Pointer to Functions-Pointer and structures.

Unit-V: **(18)**

Structure - Union- Files - Sequential Files - Random Access Files – Command Line Arguments.

Books for Study

Unit-I :

1. Rebecca Thomas, Jean Yates, “A User Guide to the UNIX System”, Osborne McGraw-Hill, USA, Second Edition, 1985.

Unit II, III, IV, V:

2. E.Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill, New Delhi, Seventh Edition, 2016.

Books for Reference

1. Sumitabha Das, “Unix Concepts and Applications”, Tata McGraw Hill, New Delhi, Fourth Edition, 2006.
2. Byron S.Gottfried, “Programming with C”, Schaum’s Outline Series, Tata McGraw Hill Edition, New Delhi, 1991.
3. Brian W. Kernighan, Dennis M. Ritchie, “The C Programming Language”, Prentice Hall of India Pvt. Ltd., New Delhi, 1989.
4. T. Jeyapoovan, “A First Course in Programming with C”, Vikas Publishing House Pvt. Ltd., First Edition, 2002.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Code 17PCA1101					Title of the Paper UNIX AND C-PROGRAMMING								Hours 6	Credits 5
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	3	3	3	4	3	3	3	3	3	3	3		3.2
CO2	4	3	3	3	3	4	3	3	3	3	3	3	2		3.1
CO3	4	3	3	3	3	4	3	3	3	2	3	3	2		3.0
CO4	3	3	3	3	3	3	4	3	3	3	4	3	2		3.1
CO5	4	4	3	3	3	3	3	3	3	3	3	3	2		3.1
CO6	3	3	3	3	4	4	4	3	3	3	3	3	2		3.2
CO7	4	4	3	3	3	4	3	3	3	3	3	3	2		3.2
CO8	4	3	3	4	3	4	4	4	3	3	3	3	2		3.3
Overall Mean Score for COs															3.1

Result: The Score for this Course is 3.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester I **Hours/Week: 6**
17PCA1102 **Credits : 5**

MATHEMATICAL FOUNDATIONS

Course Outcomes

Upon successful completion of this subject, the student will be able to:

1. Ability to apply mathematical logic to solve problems
2. Apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.
3. Understand sets, relations, relations, functions, and discrete structure
4. Know the properties of lattices and Boolean Algebra
5. Solve polynomial equation using Birge-Vieta and Graffe's root squaring method
6. Solve linear system of equation using direct methods Gauss-elimination and Gauss-Jordan Method and Iterative methods Gauss-Jacobi and Gauss-Seidal Method.
7. Know the interpolation techniques and predicting the unknown values for a given value
8. Apply numerical integration using Trapezoidal, Simpson's rules and Romberg's Method

Unit-I: (18)

Mathematical Logic: Statements and Notation - Connectives-Statement Formulas and Truth Tables - Tautologies - Equivalence of Formulas-Duality Law. Tautological implications - Theory of inference - validity using truth tables-Rules of Inference.

Unit-II: (18)

Basic concepts of Set Theory : Inclusion and Equality of sets - Power set - Operations on Sets - Venn Diagrams - Cartesian Products. Relations and Ordering - Binary & Equivalence relations - Partial Ordering. Functions Composition of functions, inverse functions, Binary & n-ary operations.

Unit-III: (18)

Lattices as Partially ordered sets - Hasse diagrams - Properties of Lattices Distributive & Modular inequalities-Special lattices -Complete, Bounded, Complemented &Distributive lattices. Properties of Boolean Algebra.

Unit-IV: (18)

Solution of polynomial equations: Birge-Vieta and Root squaring methods. System of linear algebraic equations: Gauss - elimination, Gauss - Jordan, Triangularization, Jacobi, Gauss-Seidal iterative methods.

Unit-V: (18)

Interpolation: Lagrange's and Newton's interpolation –interpolating polynomials using finite difference. Numerical integration: Trapezoidal, Simpson's rules and Romberg integration.

Note: Stress on solving Numerical Problems in Units IV and V

Books for Study

Units I, II, III

1. J.P.Tremblay & R.Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw-Hill International Edition, 2008.

Units IV, V

2. M.K.Jain, S.R.K.Iyengar & R.K. Jain, "Numerical Methods for Scientific and Engineering Computation", Wiley Eastern Limited, New Delhi, 2003.

Books for Reference

1. Bernard Kolman & Robert C. Busy by, "Discrete Mathematical Structures for Computer Science", Prentice Hall of India, New Delhi, 1987.
2. S.S. Sastry, "Introductory Methods of Numerical Analysis", Prentice Hall of India, New Delhi, 2005.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Code 17PCA1102					Title of the Paper MATHEMATICAL FOUNDATIONS								Hours 6	Credits 5
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	4	4	3	4	3	3	3	3	2	2	2		3.2
CO2	4	4	4	3	4	3	3	3	3	5	2	2	2		3.2
CO3	4	4	4	3	3	2	3	3	2	5	3	2	2		3.1
CO4	4	4	4	3	4	2	2	3	2	5	2	2	2		3.0
CO5	4	4	3	3	4	2	3	3	2	5	3	2	2		3.1
CO6	4	4	3	3	4	3	3	2	2	5	2	2	2		3.0
CO7	4	4	4	3	4	2	3	2	3	5	2	2	2		3.1
CO8	4	4	4	3	4	2	3	3	2	5	2	2	2		3.1
										Overall Mean Score for COs					3.1

Result: The Score for this Course is 3.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Totalof Values}}{\text{Total No.of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester I **Hours/Week: 6**
17PCA1103 **Credits : 4**

ORGANISATIONAL BEHAVIOUR

Course Outcomes

1. Familiarize the students to understand the basic concepts of organizational structure and its behavior.
2. Understand the Human Behaviour and Perception
3. Develop the Attitudes, Formation factors and attitude changes
4. Equip the students in building the Perceptual Interpretation and Motivation.
5. Have the group decision making and analysis
6. Acquire knowledge and capability to develop communication skills.
7. Equip their Leadership skills through various activities.
8. Have the knowledge about organizational structure and projects

Unit-I: (18)

NATURE OF ORGANIZATION-features-types-goals. NATURE OF ORGANIZATIONAL BEHAVIOR-Nature of OB-Role of OB-Foundations of OB.

Unit-II: (18)

NATURE OF HUMAN BEHAVIOR: Nature and causes of individual differences-models of man. PERCEPTION: concept-process-perceptual selectivity and distortion-Developing perceptual skills. ATTITUDES: Concept-Theories-Formation factors-measurements-Attitude change.

Unit-III: (18)

MOTIVATION: Definition-Motivation & Behavior-Theories-approaches-incentives.

INTERPERSONAL BEHAVIOR: Transactional analysis-Ego states-life scripts-life positions-transactions-stroking-Psychological games-Benefits of TA.

Unit-IV: (18)

GROUP DYNAMICS: Concepts & features of group-types of groups-group behavior-group decision making-committee-task group-inter group behavior. LEADERSHIP: Definitions-types-importance theories-styles. COMMUNICATION: Basics of communication-Communication network-Factors affecting communication-Business writing-Office management-Presentation strategies.

Unit-V: (18)

ORGANIZATION THEORY: Classical organizational theory-neoclassical organization theory-DESIGNING OF ORGANIZATIONAL STRUCTURE: need-planning and process-Departmentation Span of management-delegation of authorities-centralization & decentralization-FORMS OF ORGANIZATIONAL STRUCTURES: line and staff-functional-divisional-project-matrix-free form.

Book for study

1. Prasad LM, “Organisational Behavior”, Sultan Chand and Sons, 2014.

Books for Reference

1. SS Khanka, “Organisational Behavior”, S. Chand Ltd., New Delhi
2. K. Aswathappa, “Organisational Behavior”, Himalaya Publishing house, New Delhi

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Code 17PCA1103				Title of the Paper ORGANISATIONAL BEHAVIOUR								Hours 6	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	3	4	4	4	3	3	2	4	4	4	3	3	3.6
CO2	4	3	4	4	4	3	3	2	4	4	4	4	3	3.5
CO3	4	4	4	4	4	2	4	2	4	3	4	5	3	3.6
CO4	4	3	4	4	2	3	4	3	4	3	4	4	3	3.6
CO5	4	4	4	4	2	2	3	2	4	3	3	4	3	3.2
CO6	4	4	4	4	4	3	3	2	4	3	3	4	3	3.6
CO7	4	3	4	4	4	2	3	3	4	3	4	4	3	3.6
CO8	4	3	3	4	4	3	3	3	4	3	4	4	3	3.6
Overall Mean Score for COs														3.5

Result: The Score for this Course is 3.5 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester I **Hours/Week: 6**
17PCA1104 **Credits : 5**

DIGITAL COMPUTER FUNDAMENTALS

Course Outcomes

1. Understand and learn the fundamental concepts of digital computer
2. Know the logics of different ICs and Boolean Algebra
3. Learn the functionalities of Data processing circuits and Arithmetic circuits
4. To be skillful in digital numbers and code conversions
5. To get the functioning of registers and counters
6. Learn the memory elements and their functionalities

Unit-I: (18)

Digital Logic: The Basic Gates-NOT, OR, AND - Universal Logic Gates-NOR, NAND - AND-OR-Invert Gates. Combinational Logic Circuits: Boolean Laws and Theorems - Sum-of-Products Method - Truth Table to Kamaugh Map - Pairs, Quads, and Octets - Kamaugh Simplifications - Don't-care Conditions - Product-of-sums Method - Product-of-sums Simplification.

Unit-II: (18)

Data-Processing Circuits: Multiplexers - Demultiplexers - 1-of-16 Decoder - BCD-to-decimal Decoders - Seven-segment Decoders - Encoders - Exclusive-OR Gates. Number Systems and Codes**:** Binary Number System - Binary-to-decimal Conversion - Decimal-to-binary Conversion- Octal Numbers - Hexadecimal Numbers - The ASCII Code - The Excess-3 Code - The Gray Code.

Unit-III: (18)

Arithmetic Circuits: Binary Addition - Binary Subtraction - Unsigned Binary Numbers - Sign-magnitude Numbers - 2's Complement Representation - 2's Complement Arithmetic- Arithmetic Building Blocks - The Adder-subtracter - Arithmetic Logic Unit - Binary Multiplication and Division. Flip-Flops: *RS* FLIP-FLOPs - Gated FLIP-FLOPs - Edge-triggered *RS* FLIP-FLOPs - Edge-triggered *D* FLIP-FLOPs - Edge-triggered *JK* FLIP-FLOPs - *JK* Master-slave FLIP-FLOPs.

Unit-IV: (18)

Registers: Types of Registers - Serial In-serial Out - Serial In-parallel Out - Parallel In-serial Out - Parallel In-parallel Out - Universal Shift Register - Applications of Shift Registers. Counters: Asynchronous Counters - Decoding Gates - Synchronous Counters.

Unit-V: (18)

Memory: Basic Terms and Ideas - Magnetic Memory - Optical Memory - Memory Addressing - ROMs, PROMs, and EPROMs - RAMs-Virtual Memory-Cache Memory.

Books for Study

1. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Application", Seventh Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2011.

Books for Reference

1. Thomas C.Bartee, "Digital Computer Fundamentals", McGraw-Hill International Edition, New Delhi, 1985.
2. Morris Mano and Michael D Ciletti, "Digital Design", 4th Edition, Pearson publications, 2008.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Code 17PCA1104					Title of the Paper DIGITAL COMPUTER FUNDAMENTALS								Hours 6	Credits 5
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	3	3	4	3	4	3	3	2	3	3	3	2		3
CO2	3	3	3	3	3	3	3	3	2	5	3	4	2		3.07
CO3	3	3	3	4	3	4	3	3	2	3	3	4	2		3.07
CO4	3	3	3	3	3	4	3	3	2	5	3	4	2		3.15
CO5	4	3	3	4	3	4	3	3	3	4	3	4	2		3.30
CO6	3	3	3	4	3	4	3	3	3	3	3	4	2		3.15
														Overall Mean Score for COs	3.12

Result: The Score for this Course is 3.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester I **Hours/Week: 3**
17PCA1105 **Credits : 2**

Software Lab - I
C PROGRAMMING

1. Usage of UNIX Commands
2. Simple problems using Operators
3. Control structures (if-else, switch-case)
4. Looping structures (for, while, do-while)
5. Sorting and Searching using one dimensional array
6. Matrix operations.
7. Recursion - Factorial, GCD, Adding two numbers
8. String Manipulation using pointers
9. Pointers and Structures.
10. Structure, nested structure, structure array
11. File Handling (Text file, Sequential and Random)

Semester I **Hours/Week: 3**
17PCA1106 **Credits : 2**

Software Lab - II
MULTIMEDIA

GIMP (Photoshop equivalent)

1. Cropping images using Marquee and Lasso Tools
2. Working with images using Paint Tools
3. Designing Text using Text Tools
4. Applying Layer Effects to Images and Texts
5. Designing Employee or Student ID card
6. Designing seasonal greetings
7. Working with Filters
8. Designing professional invitations (Conferences)
9. Designing brochures or posters for a technical symposium
10. Designing Flexible banners for your college
11. Create your own wallpaper for your Desktop
12. Design a Web banner for a website
13. Develop a website using slice tool

Synfig (Flash equivalent)

1. Create an animation for bouncing a ball
2. Create an animation for making wheel role
3. Create a web banner with simple animation
4. Develop a slide show of photos with transitions

Aptana (Dreamweaver equivalent)

1. Developing a simple webpage with images and links
2. Develop a webpage displaying the timetable of the Department
3. Design an application form for Student Admission
4. Create your own web blog for college events

Semester I **Hours/Week: -**
17PCA1107 **Credits : 2**

Self-paced Learning
FUNDAMENTALS OF I.T.

Course Outcomes

1. To understand Information technology
2. To understand mobile technology architecture
3. To understand Information technologies with E-commerce, Mobile Communication, Networking devices, Multimedia and DBMS.
4. Ability to have clear outline about specific area related to IT projects.

Unit-I:

Information Technology - Meaning - Need - Components Role of IT - IT in manufacturing, IT in mobile computing, IT in public sector, IT in defense, IT in media, IT in publication, IT and internet. Emerging trends in IT - E-Commerce, IT and supply chain management, IT and SIS, Electronic Data Interchange (EDI).

Unit-II:

Emerging Trends of Information Technology: Mobile Communication, Bluetooth, Global Positioning System (GPS), Infrared Communication, Smart Card, Blue Laser Disc, Nano Technology, DNA Computing, Quantum Computer, Holographic Memory.

Unit-III:

Internet: Introduction, Relays, Repeaters, Bridges, Routers, Gateways. Internetworking: How networks differ, concatenated virtual circuits, connectionless internetworking, tunneling, internetwork Routing, fragmentation, Firewalls, internet architecture.

Unit-IV:

Multimedia: Definition - Building blocks of multimedia - Multimedia System - Applications - Virtual Reality. Internet Tools: Introduction - Web Browser - Electronic Mail - Search Engines - Instant Messaging.

Unit-V:

Computer in Business: Computers in Office Automation - Computers in Transaction Processing - Computers as Information Tools for Management Control - Computers in Engineering - Business on the Internet. Software Packages: Introduction to Word Processing - Microsoft Word - Desktop Publishing - Database Management Systems- Electronic Spreadsheets.

Books for Study

Unit I, II, III, IV:

1. ITL Education Solution Ltd, “Introduction to Information Technology”, Dorling Kindersley (India) Pvt. Ltd, New Delhi.

Unit V:

2. Leon, “Introduction to computers”, Vikas Publishing House Pvt. Ltd., New Delhi, 2006. (CH 10 and CH 13)

Books for Reference

1. Efraim Turban et al, “Introduction to Information Technology”, Wiley India Pvt. Ltd., New Delhi.
2. Srinivasa Vallaban SV, (2005), Computers in Business, Sultan Chand and Sons, New Delhi.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Code 17PCA1107			Title of the Paper Self-paced Learning: FUNDAMENTALS OF IT								Hours -	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	3	3	4	4	3	4	3	4	3	4	3	4	3.5
CO2	4	4	3	4	4	4	4	4	3	3	3	3	3	3.5
CO3	4	4	2	4	4	4	4	4	4	4	4	4	4	3.8
CO4	3	4	4	4	3	4	3	4	3	4	3	4	3	3.5
Overall Mean Score for COs														3.6

Result: The Score for this Course is 3.6 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 4**

17PCA2108 **Credits : 3**

OBJECT ORIENTED CONCEPTS AND C++

Course Outcomes

1. Acquired knowledge on basic object oriented concepts and systems
2. Acquired ability to design modular programs using functions and classes
3. Acquired the capability to manage memory efficiently
4. Acquired the ability to design objects with polymorphic behaviour
5. Acquired the skills of developing reusable code
6. Acquired ability to process data in secondary storages
7. Possesed skills to handle runtime errors
8. Acquired the knowledge on generic programming

Unit-I: (12)

Principles of Object Oriented Programming: Procedure oriented programming - Object oriented programming paradigm - basic concepts and benefits of OOP - applications of OOP - structure of C++ - applications of C++ - operators and manipulators in C++- type cast operator.

Unit-II: (12)

Functions in C++ : Function prototyping - call by reference - return by reference - inline functions - default, const arguments - function overloading - Classes and Objects: member functions - nesting of member functions - private member functions - memory allocations for objects - static data members - static member functions - arrays of objects - objects as function arguments - friendly functions - pointers to members.

Unit-III: (12)

Constructors: Parameterized constructors - multiple constructors - constructor with default parameters - copy and dynamic constructors - destructors - operator overloading - overloading unary and binary operators - overloading binary operators using friend functions.

Unit-IV: (12)

Inheritance: Defining derived classes - single inheritance -making a private member inheritable - multilevel inheritance - multiple inheritance-hybrid inheritance - virtual method - pure virtual method - virtual base classes - abstract classes - constructors in derived classes - member classes: nesting of classes.

Unit-V: (12)

Streams formatted and unformatted I/O: Defined manipulators - File I/O - reading and writing - various functions - Exception handling: try - throw - catch statements - re-throwing - Templates: Generic classes and functions.

Books for Study

1. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, New Delhi, 6th edition, 2013

Books for Reference

1. Robert Lafore, "Object oriented programming in Microsoft C++", Galgotia Publications, New Delhi, 2000
2. Bjarne Stroustrup, "The C++ Programming Language", Addison-Wesley, 1999.
3. Herbert Schildt, "C++: The complete reference", Tata McGraw Hill, New Delhi, Second edition, 1998.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Code 17PCA2108	Title of the Paper OBJECT ORIENTED CONCEPTS AND C++											Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	5	4	5	5	5	5	5	5	3	4	5	2	4.5
CO2	5	5	4	5	5	5	5	4	5	3	5	5	2	4.5
CO3	5	5	4	5	5	5	5	4	5	3	5	5	2	4.5
CO4	5	5	4	5	5	5	5	4	5	3	5	5	2	4.5
CO5	5	5	4	5	5	5	5	4	5	3	5	5	2	4.5
CO6	5	5	4	5	5	5	5	4	5	3	5	5	2	4.5
CO7	5	5	4	5	5	5	5	4	5	3	5	5	2	4.5
CO8	5	5	4	5	5	5	5	4	5	3	5	5	2	4.5
										Overall Mean Score for COs				**4.5**

Result: The Score for this Course is 4.5 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 4**
17PCA2109 **Credits : 3**

OPERATING SYSTEMS

Course Outcomes

1. To understand the services provided by the OS and the design of an operating system.
2. To understand the structure and organization of the file system.
3. To understand what a process is and how processes are synchronized and scheduled.
4. To understand the different approaches to memory management.
5. Demonstrate an understanding of different I/O techniques in operating system.
6. To know the difference between processes and threads.
7. Students should be able to use system calls for managing processes, memory and the file system.
8. To know the basic knowledge of protection and security mechanisms.

Unit-I: (12)

Introduction: Operating System-Multiprocessor Systems-Distributed Systems- Real –Time Systems. Computer- System Structures: Computer-System Operation- I/ O structure- Storage Structure-Hardware Protection . Operating System Structure: System Components- Operating –System Services –System Calls-System Programs-System Structure.

Unit-II: (12)

Process Management: Processes: Process concept-Process Scheduling-Operations on Processes-Cooperating Processes-Inter Process Communication.CPU Scheduling : Basic Concepts-Scheduling Criteria-Scheduling Algorithms- Multi- Processor Scheduling-Real-Time Scheduling. Process Synchronization: Background-The Critical-Section Problem-Synchronization Hardware- Semaphores. Deadlocks: System model – deadlock characterization-Methods for handling deadlocks-Deadlock Prevention-Deadlock Avoidance-Deadlock Detection-Recovery from Deadlock-Combined approach to deadlock handling.

Unit-III: (12)

Memory Management: Background-Swapping-Contiguous Memory Allocation-Paging-Segmentation-Segmentation with Paging. Virtual Memory: Demand Paging-Process Creation-Page Replacement-Allocation of Frames - Thrashing.

Unit-IV: (12)

File-System Interface: File Concept-Access Methods-Directory Structure-File-System Mounting-File sharing –Protection. File-System Implementation: File-System Structure-File-System Implementation-Directory Implementation-Allocation Methods-Free-Space Management.

Unit-V: (12)

Protection and Security : Protection-Goals of Protection-Domain of Protection- Access Matrix-Implementation of Access Matrix - Revocation of Access Rights –Capability- Based Systems-Language-Based Protection. Security: The Security Problem-User Authentication-Program Threats-System Threats-Securing System and Facilities-Intrusion Detection-Cryptography-Computer-Security Classifications.

Book for Study

1. Abraham Silberschatz and Peter Baer Galvin, “Operating System Concepts” 6th edition, 2007.

Books for Reference

1. Harvey M. Deitel, “An Introduction to Operating System”, Addison Wesley Publishing Company, California, 1984.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India Private Ltd, New Delhi, 1997.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Code 17PCA2109					Title of the Paper OPERATING SYSTEMS								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	2	5	4	4	4	4	3	5	4	4	2		3.8
CO2	4	4	2	5	4	4	4	4	3	4	4	4	2		3.7
CO3	4	4	3	4	4	4	3	3	4	4	4	4	3		3.7
CO4	4	4	2	4	3	3	4	3	4	4	3	3	2		3.3
CO5	4	4	3	3	4	3	4	4	3	4	3	3	2		3.4
CO6	3	4	2	3	4	3	3	4	4	3	3	4	2		3.2
CO7	4	4	2	3	3	4	4	3	3	4	4	3	2		3.3
CO8	4	4	4	4	4	4	4	3	3	4	3	4	2		3.6
Overall Mean Score for COs															3.4

Result: The Score for this Course is 3.4 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 4**
17PCA2110 **Credits : 4**

PROBABILITY AND STATISTICS

Course Outcomes

Upon successful completion of this subject, the student will be able to:

1. Understand the axiomatic formulation of modern Probability Theory and think of random variables as an intrinsic need for the analysis of random phenomena.
2. Translate real-world problems into probability models and finding a reasonable solution
3. Know the properties of discrete and continuous distribution functions and its applications
4. Use method of moments and moment generating function
5. Apply Mathematical expectations, Correlation and Regression for Practical Problems
6. Identify when and how to use various tests of hypothesis such as t, F, Chi-square
7. Compute the ANOVA table for the testing of more than two means
8. Analyze variance and design Experiments in agricultural data

Unit-I: (12)

Sample space: Events - Probability - Probability axioms - addition and multiplication law of probabilities - conditional probability-Independent events - Baye's theorem.

Unit-II: (12)

Random Variables: distribution functions (discrete and continuous)-Joint probability distribution - Marginal and conditional distribution. Mathematical expectations - Moment Generating Functions. Chebyshev's inequality.

Unit-III: (12)

Discrete distributions: Binomial and Poisson -Continuous distributions: Uniform, Exponential and Normal. Correlation and Regression.

Unit-IV: (12)

Testing of hypothesis: Tests based on normal population. Applications of chi -square, Student's-T, F- distributions - Chi-square Test - goodness of fit - Test based on mean, means, variance, correlation and regression coefficients.

Unit-V: (12)

Analysis of Variance (one way and two way classifications). Design of Experiments - Principles of Design of Experiments - Completely Randomized Design - Randomized Block Design and Latin Square Design.

Note: Stress is given on the working of problems.

Books for Study

Units I, II, III, IV

1. S.C.Gupta and V.K.Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 11th edition, 2002.

Unit V

2. S.C. Gupta and V.K. Kapoor, "Fundamentals of Applied Statistics", Sultan Chand & Sons, New Delhi, 4th edition, 2007.

Books for Reference

1. Erwin Kryszig, "Introductory Mathematical Statistics", John Wiley & sons, New York, 1990.
2. J.S. Milton and J.C. Arnold, "Probability and Statistics in Engineering and Computer Science", McGraw Hill, New York, 1986.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Code 17PCA2110					Title of the Paper PROBABILITY AND STATISTICS								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	4	4	4	3	3	3	2	5	3	3	2		3.4
CO2	4	4	4	4	4	3	3	3	3	5	3	3	2		3.5
CO3	4	4	4	4	4	3	3	3	3	5	2	2	2		3.3
CO4	4	4	4	3	4	3	3	3	3	5	3	2	2		3.3
CO5	4	4	3	4	4	3	3	2	2	5	3	2	2		3.2
CO6	4	4	4	4	3	3	3	2	2	5	3	2	2		3.2
CO7	4	4	4	3	4	3	3	2	2	5	3	2	2		3.2
CO8	4	4	4	3	4	3	3	2	3	5	3	2	2		3.2
										Overall Mean Score for COs					3.2

Result: The Score for this Course is 3.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 3**
17PCA2111 **Credits : 2**

Software Lab-III
C++

Classes and Objects

1. Programs Using classes
2. Constructors
3. Static Polymorphism: Operator overloading & function overloading
4. Inheritance Types, Function Overriding
5. Dynamic Polymorphism using virtual functions, Pure virtual functions and abstract classes
6. Formatted I/O and File operation with Command Line Arguments
7. Exception Handling
8. Templates
9. Stack and its applications
10. Queue and its applications.

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Semester II **Hours/Week: 3**
17PCA2112 **Credits : 2**

Software Lab-II
UNIX AND SHELL PROGRAMMING

Classes and Objects

1. Use of Basic UNIX Shell Commands: ls, mkdir, rmdir, cd, cat, touch, file, wc, sort, cut, grep.
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script exercises based on following:
   (i) Interactive shell scripts
   (ii) Positional parameters
   (iii) Arithmetic
   (iv) if-then-fi, if-then- else-fi, nested if-else
   (v) Logical operators
   (vi) else + if equals elif, case structure
   (vii) while, until, for loops, use of break
4. Write a shell script to create a file.
   (i) Input a page profile to yourself, copy it into other existing file;
   (ii) Start printing file at certain line
   (iii) Print all the difference between two file, copy the two files.
   (iv) Print lines matching certain word pattern.
5. Write shell script for-
   (i) Showing the count of users logged in,
   (ii) Printing Column list of files in your home directory
6. Write a shell script to print files names in a directory showing date of creation & serial number of the file.
7. Write a shell script to count lines, words and characters in its input
8. Write a shell script to compute gcd lcm & of two numbers. Use the basic function to find GCD & LCM of N numbers.
9. Write a shell script to find whether a given number is prime. Take a large number such as 15 digits or higher and use a proper algorithm.
10. Write a shell script to sum series such as sine, cosine etc.

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Semester II **Hours/Week: 4**
17PCA2201A **Credits : 4**

Core Elective-I
PYTHON

Course Outcomes

1. To explore the fundamental concepts of Python
2. To understand Basics of Python programming language
3. To solve simple problems using Python
4. To acquire fundamental knowledge and skills on Python Programming
5. To understand the nuances of this language.
6. To know the usage of modules and packages in Python
7. To familiarize with file concepts in Python
8. To familiarize with web concepts using Python.

Unit-I: (12)

Introduction to Python: Features of Python - How to Run Python - Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) - Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers-Strings-List-Tuple-Set-Dictionary-Data type conversion.

Unit-II: (12)

Flow Control: Decision Making-Loops-Nested Loops-Types of Loops. Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

Unit-III: (12)

Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling: Opening a File - Closing a File - Writing to a File - Reading from a File - File Methods - Renaming a File - Deleting a File - Directories in Python.

Unit-IV: (12)

File Handling: Opening a File - Closing a File - Writing to a File - Reading from a File - File Methods - Renaming a File - Deleting a File - Directories in Python. Object Oriented Programming: Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes - Destructors in Python-Encapsulation - Data Hiding-Inheritance - Method Overriding-Polymorphism.

Unit-V: (12)

Exception Handling: Built-in Exceptions - Handling Exceptions - Exception with Arguments - Raising Exception - User-defined Exception - Assertions in Python. Regular Expressions: The match() function - The search() function - Search and Replace - Regular Expression Modifiers: Option Flags - Regular Expression Patterns - Character Classes - Special Character Classes - Repetition Cases - findall() method - compile() method.

Text Book(s)

1. Jeeva Jose and P. Sojan Lal, “Introduction to Computing and Problem Solving with PYTHON”, Khanna Book Publising Co. (P) Ltd., 2016.

Book for References

1. Wesley J. Chun, “Core Python Programming”, Second Edition, Prentice Hall Publication, 2006.
2. Timothy A Budd, “Exploring Python”, Tata McGraw Hill, New Delhi, ISBN: 9780071321228

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Code 17PCA2201A					Title of the Paper Core Elective-I: PYTHON								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	3	2	3	3	3	4	3	3	3	3	3	3		3.0
CO2	3	4	2	3	4	3	3	4	2	2	4	4	2		3.1
CO3	3	4	3	3	3	3	3	2	2	4	3	3	3		3.0
CO4	3	4	4	4	3	4	3	4	3	4	3	4	3		3.5
CO5	3	4	3	4	5	5	3	5	3	4	3	4	4		3.3
CO6	3	4	4	4	3	4	3	4	3	4	3	4	3		3.4
CO7	3	3	4	3	3	3	4	3	3	3	3	3	3		3.1
CO8	3	4	3	3	4	3	3	4	3	3	4	4	3		3.3
Overall Mean Score for COs															3.2

Result: The Score for this Course is 3.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 4**
17PCA2201B **Credits : 4**

Core Elective-I
COMPUTER SIMULATION

Course Outcomes

1. Knowing the basic concepts of simulation and its role in problem solving.
2. Understanding and applying mathematical models for simulation
3. Understanding and applying statistical models for simulation
4. Acquiring the knowledge of queuing systems
5. Learning the generation and usage of random numbers.
6. Learning input modeling for simulation and validating the input and output.
7. Analyzing the need to incorporate simulation and modeling considerations throughout the design and execution of a project
8. Understanding the limitations and ways of improvement of a system using simulation and modeling.

Unit-I: (12)

Introduction to system simulation: System concepts - Components of a system - Discrete and continuous systems - System modeling - Types of models - System simulation - Steps in a simulation study. General Principles - Concepts in Discrete-Event Simulation. The Event Scheduling/Time Advance Algorithm - World Views - Manual Simulation Using Event Scheduling

Unit-II: (12)

Mathematical and Statistical Models: Statistical Models in Simulation - Review of Terminology and Concepts - Useful Statistical Models - Random number generation: Techniques for generating random numbers -Discrete Distributions - Continuous Distributions - Poisson Process - Properties of a Poisson Process-Non stationary Poisson Process - Empirical Distributions

Unit-III: (12)

Queueing Models: Characteristics of Queueing Systems - Queueing Notation Long-Run Measures of Performance of Queueing Systems - Steady-State Behavior of Infinite-Population Markovian Models - Steady-State Behavior of Finite-Population Models (M/Mic/KIK) - Networks of Queues

Unit-IV: (12)

Random-Number Generation: Properties of Random Numbers - Generation of Pseudo-Random Numbers - Techniques for Generating Random Numbers

- Linear congruential method - Multiplicative congruential method - Tests for random numbers - Frequency tests - Auto correlation tests - Random variate generation: Inverse transformation method - Exponential-Uniform - Empirical discrete - Empirical continuous distributions

Unit-V: (12)

Input modeling for simulation - Data collection - Identifying the distribution using histograms - Parameter estimation - Goodness of fit test - Verification and Validation of Simulation Models - Model Building, Verification, and Validation - Verification of Simulation Models - Calibration and Validation of Models - Face Validity - Validation of Model Assumptions - Validating - Input-Output Transformations - Input-Output Validation: Using Historical Input Data - Input-Output Validation: Using a Turing Test - Output analysis for a single model: Types of simulations with respect to output analysis - Output analysis for terminating simulations - Output analysis for steady state simulations

Book for Study:

1. Banks, J., Carson, J.S., Nelson, B.L., and Nicol, D.M., Discrete-Event System Simulation, 4th Edn. Pearson Education, Inc., 2007.

References

1. Law,A.W. and Kelton, W.D.,Simulation Modelling and Analysis, McGraw Hill International, 2000
2. Gordon, G., System Simulation, Second Edition, Prentice Hall of India, 1995.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Code 17PCA2201B					Title of the Paper Core Elective-I: COMPUTER SIMULATION								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	4	2	5	5	2	4	2	4	2	3	2	5	3.3	
CO2	4	3	2	4	3	5	2	3	4	2	4	1	3	3.1	
CO3	5	3	2	3	4	2	2	2	4	2	3	2	4	2.9	
CO4	3	3	3	4	4	3	3	2	2	1	2	3	4	2.8	
CO5	4	5	3	2	3	4	2	2	5	3	2	2	3	3.1	
CO6	5	4	2	3	4	5	4	4	2	2	3	3	3	3.4	
CO7	4	5	2	2	3	3	3	3	2	3	2	2	5	3.0	
CO8	4	3	2	4	3	5	2	3	5	2	3	5	3	3.4	
													Overall Mean Score for COs		3.1

Result: The Score for this Course is 3.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 4**
18PSS2301 **Credits : 4**

IDC: SOFT SKILLS

Course Outcomes:

1. Students are taught the various nuances of grooming such as, good manners and etiquettes and they are trained to practice them in the class rooms.
2. Students are empowered with public speaking skills via extempore speeches and prepared speeches, presented before the class and assessed by the trainer as well as the companions which eventually helps build self confidence of the students.
3. Students learn the different types of resumes and different types of interview skills and write and print their own resumes and present before the interview panel for their mock interview.
4. Students actively learn the ten parameters of group discussion, perform on the stage with their colleagues, which is videotaped, reviewed and evaluated.
5. As students go through their teenage, self discovery becomes a tool to develop their personality facilitated with scientific psychological personality tests.
6. Students are guided to knowing their SWOT (Strengths, Weaknesses, Opportunities and Threats)and setting their short term and long term goals for their lives.

Module 1: Basics of Communication: Definition of communication, Process of Communication, Barriers of Communication, Non-verbal Communication,

Effective Communication: The Art of Listening, Exercises in Kinesthetics, Production of Speech, Organization of Speech, Modes of delivery, Conversation Techniques, Dialogue, Good manners and Etiquettes, Politeness markers & Listening links.

Module II: Resume Writing: What is Resume? Types of Resume? Chronological, Functional and Mixed Resume, Steps in preparation of Resume, structure and framework for writing resume, Intensive training / personalized training on resume writing. **Interview Skills**: Common interview questions, Attitude, Body Language, The mock interviews, Phone interviews, Behavioral interviews.

Module III: Group Discussion: Group Discussion Basics, GD Topics for Practice, Points for GD Topics, Case-Based and Article based Group Discussions, Points for Case Studies, and Notes on Current Issues for GDS & Practicum with video coverage. **Team Building:** Team Vs Group – Synergy,

Stages of Team Formation, Broken Square-Exercise, Win as much as you win- Exercise, Leadership – Styles, Work ethics.

Module IV: Personal Effectiveness: Self Discovery, Self Esteem, Goal setting, Problem-solving, Conflict and Stress Management

Module V: Numerical Ability: Average, Percentage, Profit and Loss, Problems on ages, Simple Interest, Compound Interest, Area, Volume and Surface Area,Time and Work, Pipes and Cisterns, Time and Distance, Problems on Trains, Boats and Streams, Calendar, Clocks, Permutations and Combinations, Probability.

Module VI: Test of Reasoning: Series Completion, Analogy, Data Sufficiency, Blood Relations, Assertion and Reasoning, Logical Deduction, Direction. **Non-Verbal Reasoning**: Series, Classification

Text Book

1. Melchias, G., Balaiah John., John Love Joy (Eds) 2015. *Winners in the making*. St.Joseph's College, Trichy-2

References

1. Aggarwal, R. S. *Quantitative Aptitude, S.Chand & Sons*
2. Aggarwal, R.S. (2010). *A Modern Approach to Verbal and Non Verbal Reasoning*. S. Chand & Co, Revised Edition.
3. Covey, Stephen. (2004). *7 Habits of Highly effective people,* Free Press.
4. Egan Gerard (1994). *The Skilled Helper* (5th Ed). Pacific Grove, Brooks/ Cole.
5. Khera, Shiv (2003). *You Can Win.* Macmillan Books, Revised Edition.
6. Murphy, Raymond. (1998). *Essential English Grammar*. 2nd ed., Cambridge University Press.
7. Prasad, L. M. (2000). *Organizational Behaviour, S.Chand & Sons.*
8. Schuller, Robert. (2010). *Positive Attitudes*. Jaico Books.
9. Trishna's (2006). *How to do well in GDs & Interviews*, Trishna Knowledge Systems.
10. Yate, Martin. (2005). H*iring the Best: A Manager's Guide to Effective Interviewing and Recruiting*.

Modules	Topics	Examination Pattern	
		CIA	Online
I	Basics of Communication	15	5
II	Resume Writing & Interview Skills	15	5
III	Group Discussion & Team Building	10	5
IV	Personal Effectiveness	10	5
V	Numerical Ability (Common Session)	5	10
VI	Test of Reasoning (Common Session)	5	10
Total		**60**	**40**

Semester II **Hours/Week: 4**
17PCA2301 **Credits : 4**

IDC (WS):
DATA ANALYSIS USING R

Course Outcomes

1. Ability to perform data analysis with statistical techniques using R
2. Ability to interpret data in both diagrammatic and graphical representation
3. Ability to work with probability distributions in R
4. Ability to appreciate the types of correlation in R
5. Ability to achieve regression analysis in R
6. Ability to observe the validation of linear regression Model
7. Ability to identify the usage of graphics with R
8. Ability to carry out appropriate statistical tests using R

Unit-I: (12)

INTRODUCTION TO R: R as a Statistical Software and Language-R as a Calculator-R Preliminaries-Methods of Data Input-Data Accessing or indexing-Built-in Functions.

Unit-II: (12)

GRAPHICS: Graphics With R - Graphics Functions-Saving, Storing and Retrieving Work-Diagrammatic Representation of Data-Graphical Representation of Data-Measures of Central Tendency and Dispersion.

Unit-III: (12)

PROBABLITY AND PROBABILITY DISTRIBUTIONS: Probability: Definition and Properties-Probability Distributions-Some Special Discrete Distributions

Unit-IV: (12)

CORRELATION: Introduction-Correlation-Types of Correlation-Scatter Diagram- Coefficient Correlation and its Properties-Computation of Correlation Coefficient - Inference Procedures for Correlation Coefficient.

Unit-V: (12)

REGRESSION ANALYSIS: Linear Regression-Linear Regression Model – Model Assumptions-Linear Calibration - Inference Procedures for Simple Linear Model - Validation of Linear Regression Model.

Books for Study

1. Sudha G. Purohit, Sharad D. Gore, Shailaja R. Deshmukh, “Statistics Using R”, Narosa, Publishing House Pvt. Ltd.. 2nd Ed., 2015.

Books for Reference

1. John Maindonald and John Braun. “Data Analysis and Graphics Using R”. Cambridge University Press, Cambridge, 2003.
2. Brian Everitt and TorstenHothorn. “A Handbook of Statistical Analyses Using R”. Chapman & Hall/CRC, Boca Raton, FL, 2006. ISBN 1-584-88539-4.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Code 17PCA2301				Title of the Paper IDC (WS): DATA ANALYSIS USING R								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	4	2	5	4	4	4	4	3	5	4	4	2	3.8
CO2	4	4	2	5	4	4	4	4	3	4	4	4	2	3.7
CO3	4	4	3	4	4	4	3	3	4	4	4	4	3	3.7
CO4	4	4	2	4	3	3	4	3	4	4	3	3	2	3.3
CO5	4	4	3	3	4	3	4	4	3	4	3	3	2	3.4
CO6	3	4	2	3	4	3	3	4	4	3	3	4	2	3.2
CO7	4	4	2	3	3	4	4	3	3	4	4	3	2	3.3
CO8	4	4	4	4	4	4	4	3	3	4	3	4	2	3.6
Overall Mean Score for COs														3.5

Result: The Score for this Course is 3.5 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 4**
17PMA2301 **Credits : 4**

IDC (WS): MATLAB

Course Outcomes

After learning this course, the learner would have acquired skills to

1. Associate Mathematical and computing techniques.
2. Infer analytical and problem solving skills.
3. Prescribe commercial solution based on data analysis.
4. Interpret statistical manipulation of data.
5. Generate simulations for scientific problems.
6. Automate solutions for Algebraic Equations.
7. Predict graphical output for optimized outcomes.
8. Avail means to visualize given data in graphical format.

Unit-I: (12)

Basics of MATLAB: Basics, windows, Variables, File types, Matrices and Vectors, Matrix

manipulation, Matrix and Array Operations.

Unit-II: (12)

Matrix functions: Arithmetic operations, Relational operations, Logical operations, Elementary math functions, Matrix functions, Manipulating character strings, Array

Operations, Vectorization.

Unit-III: (12)

Built-in functions - Inline functions, Anonymous functions, Built-in functions, Complex

Arithmetic, Solving linear systems, Eigen Values and Vectors, Calculus.

Unit-IV: (12)

MATLAB programming: Script Files, Function Files, Curve Fitting and Interpolation, Numerical - Integration, Ordinary Differential Equations, Statistics, Nonlinear Algebraic

Equations.

Unit-V: (12)

Graphics - Basic 2-D Plots, Specialized 2-D plots, 3-D Plots, 3-D Surface Graphics.

Book for Study:

1. Rudra Pratap, Getting started with MATLAB 7, Oxford University Press, 2008.

Book for Reference:

1. Jaydeep Chakravorty, "Introduction MATLAB Programming, Toolbox and Simulink", Universities press, Hyderabad, 2014.
2. Brain R Hunt, Ronald L Lipsman, Jonathan M Rosenberg, "A Guide to MATLAB for Beginners and Experienced Users", Cambridge University Press, 2003

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Code 17PMA2301					Title of the Paper MATLAB								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	3	4	4	4	3	5	5	2	3	4	5	4		3.76
CO2	4	4	3	4	4	3	4	4	2	3	5	4	3		3.61
CO3	4	4	2	4	4	3	2	3	3	4	3	3	3		3.23
CO4	3	4	3	2	3	3	3	3	3	2	2	4	4		3.00
CO5	2	3	3	4	2	3	2	2	3	2	3	2	3		2.61
CO6	3	4	4	2	3	2	2	3	2	3	3	4	2		2.84
CO7	4	4	3	5	3	3	2	3	3	2	3	4	3		3.23
CO8	3	3	2	3	3	3	4	3	3	3	2	4	3		3.00
														Overall Mean Score for COs	3.16

Result: The Score for this Course is 3.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 4**
17PCA3113 **Credits : 3**

PROGRAMMING IN JAVA

Course Outcomes

On completion of the course the student will be able to

1. Develop object oriented software system
2. Design reusable code
3. Design interactive user interface
4. Have efficient runtime error handling skills
5. Process data in secondary storages
6. Develop parallel applications
7. Work with databases and networked environments
8. Develop three tier architecture based software systems

Unit-I: (12)

CLASSES AND OBJECTS: General Form of A Class - Creation of Objects - Usage of Constructors - 'this' Keyword- Constructor Overloading-Copy Constructors-Static Data Members - Static Methods- Finalize Method. INHERITANCE AND POLYMORPHISM: Inheriting Variables in a Class - Inheriting Methods in a Class - Inheritance And Constructors - Abstract Classes - Final Classes.

Unit-II: (12)

INTERFACES AND PACKAGES: Interfaces-Structure of an Interface - Implementation of an Interface Interface Inheritance. Packages - Placing the Classes in a Package - Package Hierarchy- Access Control Modifiers. APPLETS: The Life Cycle of an Applet -The Applet Class - Development and Execution of a Simple Applet - Syntax Of Applet Tag- Methods in the Graphic Class.

Unit-III: (12)

SWING:JApplet class - Icons - JLabel Control - JOptionPane Class - JTextField Control - JButton Control - JCheckBox Control - JRadioButton Control Menus. EXCEPTION HANDLING: Default Exception Handling - Exception and Error Classes - Catch Block Searching Pattern - Custom Exceptions. I/O STREAMS: Text And Binary Formats of Data - Input Stream and Output Stream Classes - Reader and Writer Classes - Data Output Stream and Data Input Stream Classes.

Unit-IV: (12)

THREADS: Life Cycle Of A Thread - Creating And Running Threads - Method In The Thread Class - Setting The Priority Of A Thread - Synchronization. NETWORKING:TCP Server Socket Class - TCP Socket Class.JAVA DATABASE CONNECTIVITY: Establishing AConnection - Creation Of Data Tables Entering Data Into The Tables - Table Updating.

Unit-V: (12)

REMOTE METHOD INVOCATION : Remote Interface-Java.Rmi. Server Package The Naming Class - Creating RMI Client And Server Classes. SERVLET: Servlet and Dynamic Webpages Life Cycle of a Servlet a Simple Servlet Javax. Servlet Package Retrieving the Values Of Parameters. COOKIES : Creating a Cookie and Sending it to the Client - Retrieving the Stored Cookies.

Book for Study:

1. C. Muthu, Programming with JAVA, Vijay Nicole Imprints Private Limited, 2nd Ed, Chennai, 2011

Book for Reference

1. Sagayaraj, Denis, Karthik and Gajalakshmi, "Java Programming-for Core and Advanced Users", Universities Press, Hyderabad, 2017.
2. Herbert Schildt, ¯Java 2: Complete Reference, Tata McGraw Hill, 5thEd., 2009

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Code 17PCA3113					Title of the Paper PROGRAMMING IN JAVA								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	4	5	5	5	4	4	5	3	5	5	2		4.4
CO2	5	5	4	5	5	5	5	5	5	3	5	5	2		4.5
CO3	5	5	4	5	5	5	5	5	5	3	5	5	2		4.5
CO4	5	5	4	5	4	5	5	5	5	3	5	5	2		4.5
CO5	5	5	4	5	5	5	5	5	5	4	5	5	2		4.6
CO6	5	5	4	5	5	5	5	5	5	4	5	5	2		4.6
CO7	5	5	4	5	5	5	5	5	5	4	5	5	2		4.6
CO8	5	5	4	5	5	5	5	5	5	4	5	5	2		4.6
Overall Mean Score for COs															4.5

Result: The Score for this Course is 4.5 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 4**
17PCA3114 **Credits : 3**

DATABASE SYSTEMS

Course Outcomes:

1. To understand the relationship between database systems and Organizational / management context
2. To understand the workings of a relational database system and normalize data;
3. To give the detailed knowledge about the Different Approaches to the Database System giving emphasis to Relational Approach and Concurrency Management.
4. Learn the fundamental concepts of a relational database system.
5. Utilize a wide range of features available in a DBMS package.
6. Analyze database requirements and determine the entities involved in the system and their relationship to one another.

Unit-I: (12)

Introduction to DBS: Basic Concepts and Definitions - Data Dictionary - Database System - DBA - Database Languages - Database System Architecture: Schemas, Sub-schemas and Instances - Three-level Architecture - Data Independence - Mappings -Data Models - Types-ER Model - Specialization and Generalization - Relational Algebra and Calculus: Structure - Relational Algebra - Relational Calculus.

Unit-II: (12)

Relational Query Languages: Introduction - Codd's Rules-Information System Based Language - Structured Query Language (SQL)-Embedded SQL.

Unit-III: (12)

Normalization: Introduction to Database Design - Functional Dependency and Decomposition - Normalization - Normal Forms - BCNF - Multi-valued and Join Dependencies.

Unit-IV: (12)

PL/SQL: A Programming Language: History - Fundamentals -Data types - Operators. Control Structures: Control Structures - Nested Blocks - SQL in PL/SQL - Data Manipulation - Transaction Control statements. PL/SQL Cursors and Exceptions - Named Blocks: Procedures - Functions-Packages -Triggers.

Unit-V: (12)

Transaction Processing and Concurrency Control - Database Recovery System - Database Security - Parallel Database Systems: Introduction to Parallel databases - Architecture - Key Elements of Parallel Database Processing -Distributed Databases - Architecture - Distributed Database design.

Books for Study

Unit I, II, III and V

1. S K Singh, "Database Systems Concepts, Design and Applications", Pearson Education, 2006.

Unit IV

2. Nilesh Shah, "Database Systems using ORACLE", Prentice Hall of India, 2005.

Books for Reference

1. Abraham Silberschatz, " Database Systems", McGraw Hill International, 1997.
2. CJ Date, "An Introduction to Database Systems", 6th Edn, Addison Wesley Publishing Company, New York, 1995.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Code 17PCA3114					Title of the Paper DATABASE SYSTEMS								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	3	4	4	4	3	2	3	3	4	3	1		3.2
CO2	4	4	4	4	4	4	4	3	4	3	4	4	1		3.6
CO3	4	3	2	3	4	4	4	4	4	3	4	4	2		3.5
CO4	4	3	2	3	4	4	4	4	4	3	4	3	2		3.4
CO5	4	3	2	3	4	4	4	4	4	3	4	3	2		3.4
CO6	4	3	2	3	4	4	4	4	4	3	4	3	2		3.4
														Overall Mean Score for COs	3.4

Result: The Score for this Course is 3.4 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 4**
17SCS3101 **Credits : 3**

DESIGN AND ANALYSIS OF ALGORITHMS

Course Outcomes:

1. To give the basis for the core of computer science.
2. To understanding the fundamental concepts in data structure
3. To learnt the basic knowledge of linked lists concepts in data structure and simplification of expressions and trees.
4. To give importance to finding the complexity (order) of algorithms.
5. To understand the searching and sorting methods.
6. Ability to have knowledge of linked list and tree concepts.
7. Working knowledge of backtracking and algebraic problems.
8. Designing of new algorithms and improve programming skill.

Unit-I: (12)

Algorithms: Introduction- Algorithm - Algorithm specification: Pseudocode Conventions, Recursive algorithms - Performance analysis: Space - Complexity, Time Complexity, Asymptotic Notation, Practical Complexities. (Sections: 1.1, 1.2, 1.3.1 to 1.3.4)

Unit-II: (12)

Data structures and Queues: Arrays-ordered lists- Representation of Arrays-Stack and Queues-Fundamentals-Evaluation of Expressions. (Sections: 2.2,2.4,3.1,3.3)

Unit-III: (12)

Linked lists and trees: Linked Lists - Singly Linked Lists- Linked Stacks and Queues-More - on Linked Lists-Simple algorithms of Doubly Linked Lists (insertion and deletion only).Trees- Binary Trees- Binary Tree - Representations- Binary Tree Traversal. (Sections: 4.1,4.2,4.5,4.8,5.2,5.3,5.4).

Unit-IV: (12)

Search and Sort: Divide and conquer - General method - Binary search - Finding the maximum and minimum in a set of items - Merge sort - Quick sort - Selection sort. Basic Traversal and Search Techniques for graphs: Breadth First Search - Depth First Search. (Sections: 3.1 to 3.5,6.2)

Unit-V: (12)

Interpolations: Backtracking - The 8-Queens problem - Algebraic problems-The general method - Evaluation and interpolation - Horner's rule - Lagrange interpolation - Newtonian interpolation. (Sections: 7.1,7.2,9.1,9.2)

Books for Study:

Unit I, IV, V

1. Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran, "Computer Algorithms C++", Second Edition, Universities Press, Hyderabad, 2017,

Unit II, III

2. Ellis Horowitz, Sartaj Sahni & Dinesh Mehta, "Fundamentals of Data Structures in C++", Universities Press, Hyderabad, 2008.

Books for References:

1. A.V. Aho, J.E.Hopcroft, J.D. Ullman, The Design and Analysis of Computer Algorithms, Addison-Wesley Publ. Comp., 1974.
2. Seymour E.Goodman and S.T. Hedetniemi, Introduction to the design and analysis of algorithms, McGraw Hill International Edition, 2002 Unit I,IV,V

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Code 17SCS3101			Title of the Paper DESIGN AND ANALYSIS OF ALGORITHMS								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	3	4	3	3	4	3	2	4	3	4	3	4	3.3
CO2	3	4	3	4	4	4	4	3	3	4	3	2	4	3.4
CO3	3	4	5	4	3	3	4	3	4	3	3	4	3	3.5
CO4	3	5	4	3	4	4	4	4	3	4	2	3	4	3.6
CO5	3	2	4	3	3	4	3	4	3	4	3	4	4	3.3
CO6	4	5	4	3	3	4	4	3	4	3	4	2	4	3.6
CO7	3	4	3	4	2	3	4	3	4	4	3	4	3	3.3
CO8	4	3	4	1	4	3	4	3	4	4	2	3	4	3.3
Overall Mean Score for COs														3.4

Result: The Score for this Course is 3.4 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 3**
17PCA3115 **Credits : 2**

Software Lab-V
JAVA

1. Classes & Objects
2. Inheritance & Polymorphism
3. Packages & Interfaces
4. Applet & Swing
5. Exception Handling
6. I/O Streams
7. Multithreading
8. Networking &JDBC
9. RMI
10. Servlets
11. Cookies
12. JDBC

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Semester III **Hours/Week: 3**
17PCA3116 **Credits : 2**

Software Lab-V1
RDBMS

SQL - Simple queries using DDL, DML, and DCL

1. SQL functions
2. SET operations
3. View and Snapshots
4. Nested queries

PL/SQL

6. PL/SQL Block
7. Cursors
8. Database triggers
9. Subprograms and packages.

Forms and Reports

10. Designing forms with menus, buttons and List of values
11. Master-Detail form design.
12. Developing reports (Tabular, Master/detail, Matrix and Mailing label)

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Semester III **Hours/Week: 4**
17PCA3202A **Credits : 4**

Core Elective-II

COMPUTER ORGANISATION AND ARCHITECTURE

Course Outcomes:

1. Gain basic knowledge on various building blocks of a digital computer.
2. Understand the CPU organization and different kinds of processing techniques
3. To learn the computer arithmetic operations
4. Get to know the architecture of 8086 and their instruction set
5. To understand the architecture of advanced microprocessors
6. To compare the technical nuances of microprocessors

Unit-I: (12)

Basic Computer Organisation and Design: Instruction codes-Computer registers - Computer Instructions - Timing and Control - Instruction cycle Memory reference instructions-Input/output & Interrupt-Design of Basic Computer-Design of Accumulator Logic. Micro programmed control: Control memory-Address sequencing-Micro program example-Design of control unit.

Unit-II: (12)

CPU: General register organisation - Stack organisation - Instruction formats-Addressing modes - data transfer and manipulation - Program Control RISC. Pipeline & Vector Processing: Parallel processing - Pipelining Arithmetic pipeline-Instruction pipeline-RISC pipeline-Vector processing-Array processors.

Unit-III: (12)

Computer Arithmetic: Addition, Subtraction, Multiplication and Division algorithms - Floating point arithmetic operations - Decimal arithmetic unit Decimal arithmetic operations.

Unit-IV: (12)

Intel 8086-Introduction-8086 Architecture-8086 Addressing Modes of 8086-80186/80188 Architecture - Introduction to the 80286 Microprocessor Introduction to the 80386 Microprocessor-Special 80386 Registers.

Unit-V: (12)

Introduction to the Pentium Microprocessor - Introduction to the Pentium Pro Microprocessor - Special Pentium Pro Features - Introduction to the Pentium II Microprocessor - The Pentium III - The Pentium 4 and Core2.

Books for Study

Units I, II, III

1. M. Morris Mano, "Computer System Architecture", Third Edition, Prentice Hall of India, New Delhi, 2003.

Units IV, V Note : Stress on architecture only.

2. Barry B. Brey, "The Intel Microprocessors 8086/ 8088,80186/ 80188,80286,80386,80486, Pentium, And Pentium Pro Processor, Fourth Edition, Prentice-Hall of India Pvt. Ltd, New Delhi.1999.

Book for Reference

1. M. Rafiquzzaman "Microprocessors Theory and Applications" Revised Edition, PHI Learning Pvt. Ltd, New Delhi, 2012.
2. Smruti Ranjan Sarangi, "Computer Organisation And Architecture", TMH, New Delhi, 2014, ISBN: 9789332901834

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Code 17PCA3202A			Title of the Paper COMPUTER ORGANISATION AND ARCHITECTURE								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	3	3	3	3	4	3	3	3	3	3	4	2	3.15
CO2	4	4	3	3	4	4	3	3	3	2	3	4	2	3.23
CO3	4	4	3	3	4	4	3	3	3	4	3	4	2	3.38
CO4	4	4	3	4	4	4	3	3	3	3	3	4	2	3.30
CO5	4	4	4	3	4	4	4	3	3	4	4	4	2	3.46
CO6	3	3	3	4	3	4	4	3	3	3	3	4	2	3.23
Overall Mean Score for COs														3.29

Result: The Score for this Course is 3.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 4**
17PCA3202B **Credits : 4**

Core Elective-II
ENTERPRISE RESOURCE PLANNING

Course Outcomes

After learning this course, the learner would have acquired skills to

1. To understand the plan and design of ERP systems
2. To understand the how ERP is implemented in various divisions of an organization
3. To comprehend the management of ERP Project
4. To learn how to model a supply chain system
5. To learn to improve the performance of the system by being able to forecast demand and to schedule supply
6. To understand and design Customer Relationship application modules.

UNIT-I (12)

A Foundation for Understanding Enterprise Resource Planning systems-Reengineering and Enterprise Resource Planning Systems-Planning ,Design ,and Implementation of Enterprise Resource Planning Systems-ERP systems: Sales and Marketing-ERP Systems: Accounting and finance ERP Systems : Production and Materials Management ERP Systems: Human Resources

UNIT-II (12)

Managing an ERP Project-Supply chain Management and the marketplace-Rules of the game-Winning as a team.

UNIT-III (12)

Solutions - Supply chains as Systems - Modeling the Supply Chain-Supply Chain Software - Operations-Meeting Demand-Maintaining Supply-Measuring Performance

UNIT-IV (12)

Planning-Forecasting Demand-Scheduling Supply-Improving performance-Mastering Demand-Designing the Chain-Maximizing Performance

UNIT-V (12)

Essentials of Customer relationship management-Designing CRM application-Various modules of CRM application - Advantages of CRM

Books for Study

1. Sumner Mary, Enterprise Resource Planning, First edition, Pearson education, 2006 (ISBN 81-317-0240-5) (Unit 1: Chapters 1 to 7; Unit 2: Chapters 8, 9 (continued on text book number TWO)
2. Taylor David A., Supply Chains (A managers guide), Pearson education, 2004 (ISBN 81-297-0334-3) (Unit 2: Chapters 1, 2, 3; Unit 3: Chapters 4, 5, 6, 7, 8, 9; Unit 4: Chapters 10, 11, 12, 13)
3. Tiwana, Essential guide to knowledge management : The e-business and CRM applications, Pearson education (ISBN 81-780-8326-4) (Unit 5)

Books for Reference

1. ALTEKAR Rahul V., Enterprise wide resource planning (Theory and practice), Prentice Hall of India, 2005 (ISBN 81-203-2633-4)
2. Garg Vinod K & Venkitakrishnan N.K, Enterprise resource planning, Second edition, Prentice Hall of India, 2006 (ISBN 81-203-2254-1).
3. Handfield R. B & Nichols. Ernest L., Introduction to supply chain management, Prentice Hall of India, 2006 (ISBN 81-203-2753-5)

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Code 17PCA3202B					Title of the Paper ENTERPRISE RESOURCE PLANNING								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	4	2.5	4	3	4	4	3	2.5	4	4	2	2		3.2
CO2	3	4	3	4	3	4	5	4	5	3	4	5	2		3.7
CO3	3	4	3	4	3	4	5	4	4	3	4	4	2		3.6
CO4	3	4	4	4	4	4	4	4	4	3	4	4	2		3.6
CO5	3	4	3	4	3	4	5	4	4	3	4	5	2		3.6
CO6	3	4	3	4	3	4	4	4	4	4	4	3	2		3.5
														Overall Mean Score for COs	3.5

Result: The Score for this Course is 3.5 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 4**
17PCA3402 **Credits : 4**

IDC (BS):
WEB DESIGN

Course Outcomes

1. To understand the Internet concepts and Realize the Basic Network concepts
2. To learn and identify the features of HTML tags
3. To design the HTML tables, frames and forms
4. To acquire the basic concepts of JavaScript Programming
5. To comprehend the objects in HTML and Java Script
6. To handle the events and set the cookies in Java Script
7. To develop the programming skills using Markup and Scripting Languages
8. To design the simple web pages using HTML and JavaScript

Unit-I: (12)

Networking Concepts: INTERNET - History - Applications-Users - Protocols - Host Machines and Host Names - Internet Architecture and Packet Switching- Client Server Model - Band width and Asynchronous Communication. Connection: Dial-up Access-Direct and Dedicated Connections - shell or TCP/ IP accounts - Domains and Addresses - IP addresses.

Unit-II: (12)

HTML: Introduction to HTML Tags - Document Layout - Comments - Headings-Paragraphs -Breaks - Texts - Lists - Special Characters.

Unit-III: (12)

HTML: Tables - Linking documents - Frames - Form and its elements.

Unit-IV: (12)

JavaScript: Introduction to JavaScript - JavaScript in web pages-writing JavaScript with HTML - Basic programming techniques - operators and expressions - conditional checking - loops - functions - user defined functions - dialog boxes.

Unit-V: (12)

JavaScript: JavaScript DOM: JSS DOM - understanding objects in HTML - browser objects - web page object hierarchy - Handling events - The form object - built-in objects-user defined objects - cookies - setting a cookie.

Books for Study:

Unit I

1. Wendy G.Lehnert, "Internet 101 - a beginners guide to the internet and the world wide web", addition wesley, 1999.

Unit- II, III, IV, V

2. Ivan N. Bayross, "Web enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP", 4th Revised Edition, BPB Publications, New Delhi, 2010.

Book for Reference

1. Chuck Musciano & Bill Kennedy, "HTML - The Definitive Guide", Shroff Publishers & Distributors Pvt. Ltd., Calcutta - 1999.
2. Raj Kamal, " Internet And Web Technologies", TMH, New Delhi, SBN: 9780070472969

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Code 17PCA3402				Title of the Paper IDC (BS): WEB DESIGN								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	5	4	4	5	5	3	3	3	1	3	3	3	3.6
CO2	4	5	4	4	5	5	3	3	3	1	3	3	3	3.5
CO3	4	5	4	4	5	5	3	3	3	1	3	3	3	3.5
CO4	4	5	5	4	5	5	3	3	3	1	3	3	3	3.6
CO5	5	5	5	4	5	5	3	3	3	1	3	3	3	3.6
CO6	5	5	5	4	5	5	3	3	3	3	3	3	3	3.8
CO7	5	5	5	4	5	5	3	3	3	3	3	3	3	3.8
CO8	5	5	5	4	5	5	3	3	3	3	3	3	3	3.8
Overall Mean Score for COs														3.6

Result: The Score for this Course is 3.6 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 4**
17PCA3117 **Credits : 2**

Online Course-I
QUANTITATIVE APTITUDE

Course Outcomes

1. To revise and master the basic techniques of arithmetic operations
2. To improve analytical and quantitative skills.
3. To improve with problems solving and logical skills
4. To acquire the knowledge in Time and Distance, Time and Work.
5. To aware simple and compound interests.
6. Too familiar with statistical and business problems.

Unit-I: (12)

Numbers- Decimal Fractions - Simplification - Square Roots- Cube roots

Unit-II: (12)

Surds- Indices - Average - Problems in numbers and ages –Partnership

Unit-III: (12)

Percentages - Profit and Loss- Time and Work - Time and Distance -

Unit-IV: (12)

Problems on Trains - Simple Interest - Compound Interest- Logarithms

Unit-V: (12)

Area - Calendar-Permutation and Combination- Probability.

Book for Study

1. R. S. Aggarwal, “Quantitative Aptitude for Competitive Examinations”, 21st Edition, S. Chand and Co. Ltd, New Delhi, 2015.

Book for Reference

1. Shripad Deo, “Quantitative Aptitude”, Allied Publishers Pvt. Ltd, 2014.
2. Abhijit Guha, “Quantitative Aptitude For Competitive Examinations”, TMH, New Delhi, 2016, ISBN: 9789351343554.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Code 17PCA3117			Title of the Paper QUANTITATIVE APTITUDE								Hours 4	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	3	3	3	5	3	3	4	5	3	5	3	4	2	3.5
CO2	3	3	2	4	3	3	4	5	3	4	4	4	2	3.4
CO3	3	4	2	5	3	3	4	5	4	4	3	3	2	3.5
CO4	3	2	3	4	3	2	2	4	3	5	4	3	2	3.1
CO5	3	2	4	3	3	2	3	3	3	5	3	3	2	3.0
CO6	3	3	3	3	3	2	3	3	3	4	3	3	2	2.9
Overall Mean Score for COs														3.2

Result: The Score for this Course is 3.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 5**
17PCA4118 **Credits : 4**

PROGRAMMING SMART DEVICES

Course Outcomes

1. Ability to develop applications for smart devices using android.
2. Ability to handle operation of the application, configuration files, intents, and activities.
3. Ability to work with UI-component layouts, event handling, and screen orientations.
4. Ability to appreciate android framework and features.
5. Ability to develop xml to create layouts in android.
6. Ability to design interfaces like Buttons, Menus, and Dialogs.
7. Ability to design different types of screen layouts in android.
8. Ability to operate graphics resources in android.

Unit–I: (15)

Introducing the Android Software Development Platform: Understanding Java SE and the Dalvik Virtual Machine-The Directory Structure of an Android Project-Common Default Resources Folders-The Values Folder-Leveraging Android XML- Screen Sizes-Desktop Clocks- Using Android Application Resources-Launching Application: The Android Manifest.xmlFile - Creating Your First Android Application-Running the App-Adding an Application Icon-Adding Transparency.

Unit–II: (15)

Android Framework Overview: The Foundation of OOP: The Object-The Blue print for an Object: The Class-Providing Structure for Classes: Inheritance-Defining an Interface-Bundling Classes- An Overview of XML-The APK File-Android Application Components-Android Activities-AndroidServices-BroadcastReceivers-ContentProviders-AndroidManifestXML.

Unit–III: (15)

Screen Layout Design- Android View Hierarchies –Nesting Views- Defining Screen Layouts- Editing the main.xml File-Using Relative Layouts-Sliding Drawers-Using Padding and Margins with Views and Layouts.

Unit–IV: (15)

UIDesign: Buttons, Menus, and Dialogs: Using Common UI Elements-Adding an Image Button to Your Layout-Defining Multistate Image Button

Graphics in XML –Editing the main.xml File-Replacing the Default Background- Adding a Text to Your Layout- Adding an Image-Using Menus in Android-Creating the Menu Structure with XML- Running the Application in the Android Emulator- Making the Menu Work-Adding Dialogs.

Unit–V: (15)

An Introduction to Graphics Resources in Android: Introducing the Drawables-Implementing Images –Creating Animation in Android- Tween Animation in Android-Using Transitions-Creating9-PatchCustom Scalable Images-Playing Video in Android Apps.

Books for Study:

1. Wallace Jackson, "Android Apps for Absolute Beginners", Apress, 2011.
2. Wallace Jackson, ISBN-13(pbk):978-1-4302-3446-3,ISBN-13 (electronic): 978-1-4302-3447-0,

Books for Reference:

1. Dave Smithand Jeff Friesen, "Android Recipes:A Problem–Solution Approach", Rakmo Press(P)Ltd, New Delhi, 2011.
2. J.F. DiMarzio, "Android A Programmers Guide", TMH, New Delhi, 2010. ISBN: 9780071070591.

Web Reference

Android Developer's Guides – available at: http://developer.android.com/

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Code 17PCA4118					Title of the Paper PROGRAMMING SMART DEVICES								Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	2	3	5	4	4	4	4	3	4	4	1		3.5
CO2	4	4	2	4	4	3	4	3	4	3	4	4	1		3.7
CO3	3	3	2	4	4	4	3	3	4	4	4	4	1		3.3
CO4	4	4	2	4	4	4	4	4	3	3	3	4	1		3.7
CO5	4	3	2	3	3	4	3	4	4	3	3	4	1		3.2
CO6	4	4	2	4	4	4	4	3	3	4	3	4	2		3.5
CO7	4	3	3	4	4	4	3	4	3	4	4	4	2		3.6
CO8	4	4	2	4	4	4	3	3	4	3	4	4	2		3.5
														Overall Mean Score for COs	3.5

Result: The Score for this Course is 3.5 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 5**
17PCA4119 **Credits : 4**

ACCOUNTING AND FINANCIAL MANAGEMENT

Course Outcomes

1. Analyze and record transactions, construct financial statements, and close the books for the accounting period.
2. Ability to adjust and correct errors in the process of accounting.
3. Understand the fall in value of assets and use of accounting packages.
4. Identify and analyze the costing systems adopted in the business organizations.
5. Demonstrate mastery of costing systems, cost management systems.
6. Ability to appreciate budgeting systems and performance.
7. Critically analyse and provide recommendations to improve the operations of organizations.
8. Demonstrate the need for appropriate decision making, control and performance evaluation of an organization.

Unit-I:

Accounting: Principles-Concepts-Conventions-Journals-Ledger-Trial Balance. (15 hr)

Unit-II: (15)

Trading account: Profit and Loss Account-Balance Sheet-Adjustments-Error Correction

Unit-III: (15)

Depreciation; Meaning-need-methods of charging depreciation (Straight Line Method Diminishing Balance Method). Tally: General framework-accounting applications.

Unit-IV: (15)

Marginal Costing - Break Even Analysis - Standard Costing: Analysis of Variance.

Unit-I: (15)

Budgeting: Characteristics - Advantages - Classification - Preparation of Budgets. Capital Budgeting: Meaning - Methods of Capital Investment Decision-making.

Books for Study

1. T.S Grewal, “Double Entry Book Keeping”, Sultan chand Sons, New Delhi, 1986.
2. S.N. Mahewari, “Management Accounting”, Sultan chand Sons, New Delhi, 1986.
3. R Ramachandran & R Srinivasan, “Management Accounting” (Theories, Problems & Solutions), Sriram Publications.

Book for Reference

1. M.C. Shukla, T.S. Grewal, “Advanced Accounting”, S. Chand and Company (Pvt.) Ltd., Ram Nagar, New Delhi,1988.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Code 17PCA4119	Title of the Paper ACCOUNTING AND FINANCIAL MANAGEMENT										Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	2	4	4	4	1	1	2	4	4	5	3	3	3.2
CO2	5	2	4	5	4	2	2	2	4	4	4	4	2	3.3
CO3	5	4	5	4	4	2	4	2	4	3	4	5	2	3.6
CO4	4	2	5	4	2	2	2	2	5	3	4	4	2	3.1
CO5	4	4	4	4	2	2	3	2	4	3	3	4	2	3.1
CO6	4	4	4	4	4	2	3	2	4	3	3	5	3	3.4
CO7	4	3	4	4	4	2	3	3	4	3	4	4	2	3.3
CO8	4	3	3	4	4	2	3	3	4	3	4	4	2	3.3
Overall Mean Score for COs														3.3

Result: The Score for this Course is 3.3 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 5**
17PCA4120 **Credits : 4**

GRAPH AND AUTOMATA THEORY

Course Outcomes

Upon successful completion of this subject, the student will be able to:

1. Study various operations on graphs
2. Know the various matrix representations of Graph
3. Understand Tree Properties
4. Know basic terminologies on digraph
5. Study various algorithms on Graph
6. Construct NFA and DFA
7. Master the applications of finite automata
8. Know the various Grammar and different normal forms

Unit-I: (15)

Graph Introduction: Paths and Circuits - isomorphism, Connected & Disconnected Graphs, Euler graphs - Operations on Graphs-Hamiltonian Paths & Circuits.

Unit-II: (15)

Trees and Matrix Representations: Properties of Trees, Rooted and Binary Trees, Spanning trees. Matrix representation of Graphs: Incidence Matrix, Adjacency Matrix, Circuit Matrix - Fundamental Circuit Matrix.

Unit-III: (15)

Directed Graphs: Some types of digraphs, trees with directed edges. Graph Theoretic Algorithms - Computer representation of a Graph. Algorithms for connectedness & components, spanning tree, shortest path.

Unit-IV: (15)

Finite State Systems: Basic definitions - Non-Deterministic Finite Automata - Finite Automata with epsilon moves-Regular Expressions, Applications of Finite Automata.

Unit-V: (15)

Motivation and Introduction: Context- Free Grammars - Derivation Trees - Chomsky Normal Form - Greibach Normal Form - The Pumping Lemma for CFL's.

Note: Stress can be given to problem solving instead of proof of theorems in Units IV and V.

Books for Study

Units I, II, III

1. Narsing Deo, "Graph Theory with applications to Engineering and Computer Science", Prentice-Hall of India Limited, New Delhi,2013.

Units IV, IV

2. John E. Hopcroft & Jeffery D.Ullman, "Introduction To Automata Theory, Languages and Computation", Narosa Publishing House, New Delhi,2002.

Books for Reference

1. John E. HopCroft & Jeffery D. Ullman, "Formal Languages and Their Relation to Automata", Addison - Wesley publishing company, London, 1969.
2. Bernard Kolman & Robert C. Busby, "Discrete Mathematical Structure for Computer Science" Prentice Hall of India, New Delhi, 1987.

Note: Stress to be on solving Numerical Problems only.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Code 17PCA4120					Title of the Paper GRAPH AND AUTOMATA THEORY								Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	3	4	4	4	3	4	3	3	3	4	2		3.1
CO2	3	3	3	4	4	3	4	3	4	3	4	3	2		3.3
CO3	4	3	3	3	3	4	4	3	3	3	3	3	2		3.2
CO4	3	3	3	3	4	4	3	3	4	3	3	3	2		3.1
CO5	4	3	4	3	3	4	4	4	4	4	4	3	3		3.6
CO6	4	4	3	3	3	3	3	3	3	3	4	3	2		3.1
CO7	4	4	4	3	3	3	4	4	3	3	4	3	2		3.4
CO8	4	4	4	4	3	3	5	4	3	3	4	3	2		3.5
										Overall Mean Score for COs					3.3

Result: The Score for this Course is 3.3 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 5**
17PCA4121 **Credits : 3**

COMPUTER NETWORKS AND SECURITY

Course Outcomes

Students completing this course will be able to

1. Obtain the fundamental knowledge in computer network communication
2. Understand the OSI reference model
3. Learn the technical factors of each layer in OSI reference model
4. Understand the fundamentals of network security
5. Learn the encryption and digital signature techniques
6. Know the network security issues at IPv4 and IPv6

Unit-I: (15)

Introduction: Definition for the networks-Uses of Networks - Network Architecture-Protocol hierarchies - Service Primitives - OSI Reference Model - ARPANET - Internet - Physical Layer Transmission Media - Telephone Systems.

Unit-II: (15)

Data link layer: Data link layer - Design Issues - Error Detection and Correction - Data Link Protocols - Sliding Window Protocols - Finite state Machine Model - Petri Networks-PPP-Polling - FDM.

Unit-III: (15)

Network Layer: Design Issues - Routing Algorithms - Congestion Control Algorithms - Inter Network Routing - Fragmentation.

Unit-IV: (15)

Transport Layer - Design Issues - Elements of Transport Protocols - The Internet - Transport Protocol (TCP &UDP) - Application Layer: Design Issues.

Unit-V: (15)

Network Security: Security Requirements and Attacks - Confidentiality with Symmetric Encryption - Message Authentication and Hash Functions - Public -key Encryption and Digital Signatures - Secure Socket Layer and Transport Layer Security - IPv4 and IPv6 Security.

Books for Study

1. Andrew S Tanenbaum, “Computer Networks”, Prentice Hall of India, New Delhi, 1999.

Unit V

2. William Stallings, “Data and Computer Communications”, Prentice Hall of India, Seventh Edition, 2004.

Books for Reference

1. Vijay Ahuja, “Design and Analysis of Computer Communication Networks”, McGraw Hill, New York, 1985.
2. Behrouz A Fourouzan, “Data Communications and Networking”, McGraw Hill, Fourth Edison, 2006.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Code 17PCA4121			Title of the Paper COMPUTER NETWORKS AND SECURITY									Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	4	3	4	4	4	4	4	3	3	4	4	2	3.61
CO2	3	3	3	3	3	4	3	3	3	3	3	4	2	3.07
CO3	3	3	3	3	3	4	3	3	3	3	4	4	2	3.15
CO4	3	4	3	3	3	4	4	3	3	3	3	4	2	3.23
CO5	4	4	3	4	4	4	4	4	4	4	4	4	2	3.76
CO6	4	4	3	4	4	4	4	4	3	3	4	4	2	3.61
													Overall Mean Score for COs	3.41

Result: The Score for this Course is 3.4 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No.of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semester IV
17PCA4122

Hours/Week: 3
Credits : 2

Software Lab-VII

XML & ANDROID PROGRAMMING

XML

1. XML document creation
2. Style sheets: CSS
3. Style sheets: XSL
4. XSL templates
5. Validation using DTD
6. SAX and DOM

Android

1. Different Layout design including nested layout for a single biodata.
2. Arithmetic Operation for two numbers
3. Business Calculator
4. Animation: Bouncing of a ball
5. Intent
6. Database SQ Lite: Student Biodata
7. Fragments - Tablet Programming
8. Media Player

Semester IV **Hours/Week: 3**
17PCA4123 **Credits : 2**

Software Lab-VIII
PHP & MYSQL

PHP

1. Develop a PHP program using controls and functions
2. Develop a PHP program and check message passing mechanism between pages.
3. Develop a PHP program using String function and Arrays.

PHP ADVANCED CONCEPTS

4. Develop a PHP program using parsing functions (use Tokenizing)
5. Develop a PHP program and check Regular Expression, HTML functions, Hashing functions.
6. Develop a PHP program and check File System functions, Network functions, Date and time functions.
7. Develop a PHP program using session
8. Develop a PHP program using cookie

PHP / MYSQL

9. Develop a PHP program to display student information using MYSQL table.
10. Develop a college application form using MYSQL table.

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Semester IV **Hours/Week: 4**
17PCA4203A **Credits : 4**

Core Elective-III
DATA MINING TECHNIQUES

Course Outcomes

Up on successful completion of the course, students should be able to

1. Demonstrate the concepts of Data Warehouse and Data Mining techniques.
2. Understand the different kinds of Data and their sources
3. Process raw data to make it suitable for various data mining algorithms
4. Examine the types of the data to be mined and apply pre-processing methods on raw data.
5. Discover interesting patterns, analyse supervised and unsupervised models and estimate the accuracy of the algorithms.
6. Apply the techniques of clustering, classification, visualization and data mining software tools
7. Apply the techniques of association finding and feature selection to real world data
8. Ensuring security and privacy while applying mining techniques

Unit-I: (12)

Data mining-Introduction: –Data mining process-software development approach-the CRISP DM approach, Data understanding and data preparation: Data collection and pre-processing, Outliers-Mining Outliers-missing data-types of data-computing distances-data summarizing-visualization.

Unit-II: (12)

Association rule mining: The task and the Naïve algorithm-Apriori algorithm-Apriori TID-DHP-DIC-Mining Frequent Patterns-Performance evaluation of algorithms. Classification: Decision tree-Split algorithm-Gini index-overfitting-pruning-Naïve Bayes method-estimating accuracy-improving accuracy.

Unit-III: (12)

Cluster analysis: Desired features-partitional methods-hierarchical methods-Dealing with large databases-Quality and validity of Cluster analysis methods. Web mining: Web terminology and characteristics-locality and hierarchy in the Web-Web content mining-Web usage mining - Web structure mining-web mining software.

Unit-IV: (12)

Search engines and query mining: Differences between and Web search and IR-characteristics of search engines-search engine functionality-search engine architecture-ranking of web pages-query mining-privacy. Data warehousing: Operational data stores-Data warehouses- Data Warehouse design-guidelines for DW implementation-DW metadata-Software for ODS and data warehousing.

Unit-V: (12)

Online Analytical Processing: OLAP-Characteristics of OLAP systems-motivations for using OLAP-multidimensional view and data cube-Data cube implementations-Data cube operations-guidelines of OLAP implementation-OLAP software. Information privacy and data mining: Basic principles to protect information privacy-privacy legislation in India-uses and misuses of data mining-primary aims and pitfalls of DM-Technological solutions.

Book for Study:

1. G.K. Gupta, "Introduction to Data mining with Case Studies", PHI Learning Pvt. Ltd., 2006.

Books for Reference

1. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers an imprint of Elsevier, 3rd Ed, 2012.
2. Margret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Code 17PCA4203A					Title of the Paper DATA MINING TECHNIQUES								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	3	1	4	4	3	4	4	3	4	3	2		3.2
CO2	4	4	3	2	4	4	3	2	4	2	4	4	2		3.2
CO3	4	4	3	1	4	4	3	4	4	3	3	4	2		3.3
CO4	4	3	4	1	4	4	4	4	4	3	4	3	2		3.4
CO5	4	3	4	1	3	3	3	4	4	3	4	4	2		3.2
CO6	4	3	3	2	4	4	4	3	4	3	4	4	2		3.4
CO7	4	3	3	1	4	4	3	4	4	3	4	3	2		3.2
CO8	4	4	3	2	4	4	3	2	4	2	4	4	2		3.2
														Overall Mean Score for COs	3.2

Result: The Score for this Course is 3.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Totalof Values}}{\text{TotalNo.of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 4**
17PCA4203B **Credits : 4**

Core Elective-III

INFORMATION STORAGE AND MANAGEMENT

Course Outcomes:

1. Awareness of Storage Architectures, including Storage Subsystems.
2. Define variety of Storage System Environments.
3. Knowledge of different RAID levels and their suitability for different application environments.
4. Understand the Characteristics and Components of Storage Area Networks (SAN).
5. Define the Components of SAN, Fibre Channel (FC) Protocols and Topologies.
6. Describe the File Sharing Operations and Protocols on Network Attached Storage (NAS).
7. Describe the different Backup, Recovery Topologies and their role in providing disaster Recovery.
8. Describe different types of Storage Virtualization and File level Virtualization.

Unit-I: Introduction to Information Storage and Management: (12)

Information Storage: Data - Types of Data - Information - Storage - Evolution of Storage Technology and Architecture - Data Center Infrastructure - Core Element - Key Requirement for Data Center Elements - Managing Storage Infrastructure - Key Challenges in Managing Information- Information Lifecycle: Information Life Cycle Management-ILM Implementation - ILM Benefits - Direct Attached Storage and Introduction to Scsi: Types of DAS Internal DAS, External DAS - DAS Benefits and Limitation - Disk Drive Interfaces - Idle/Ata, Sata, IDE/ATA, SATA Parallel SCSI - Introduction to Parallel SCSI: Evolution of SCSI - SCSI Interface - SCSI-3 Architecture - Parallel SCSI Addressing - SCSI Command Model-CDB Structure - Operation Code - Control Field - Status.

Unit-II: Storage System Environment and RA/D: (12)

Components of Storage System Environment: Host - Connectivity- Storage Disk Drive Components - Platter, Spindle, Read/Write Head, Actuator Arm Assembly, Controller, Physical Disk Structure, Zoned Bit Recording, Logical Block Addressing - Disk Drive Performance: Disk Service Time - Logical Components of the Host - Operating System - Device Driver - Volume Manager

File System - Application- Data Protection: RA/D: Implementation of RA/D Software RA/D - Hardware RA/D-RA/D Array Components - RA/D Levels Striping - Mirroring - Parity - RA/D 0 - RA/D 1 - Nested RA/D- RA/D 3 - RA/D 4 - RA/D 5 - RA/D6 - RA/D Comparison - RA/D Impact on Disk Performance: Application IOPS and RA/D Configuration - Hot Spares.

Unit-III: Intelligent Storage System and Storage Area Network: (12)

Components Of An Intelligent Storage System: Front End - Cache - Back End - Physical Disk - Intelligent Storage Array - High End Storage Systems Midrange Storage System - Storage Area Network: Fibre Channel: Overview The SAN and its Evolution - Components of SAN - Node Ports - Cabling - Interconnect Devices - Storage Arrays - SAN Management Software - FC Connectivity- Point to Point - Fibre Channel Arbitrated Loop - Fibre Channel Switched Fabric - Fibre Channel Ports - Fibre Channel Architecture : Fibre Channel Protocol Stack - Fibre Channel Addressing - FC Frame - Structure and Organization of FC Data - Flow Control - Classes of Service - Zoning - Fibre Channel Login Types - FC Topology - Core-Edge Fabric - Mesh Topology.

Unit-IV: Network Attached Storage and Content Addressed Scheme: (12)

Network Attached Storage: General Purpose Servers Vs NAS Devices - Benefits of NAS - NAS File I/O - File System And Remote File Sharing - Accessing a File System - File Sharing - Components of NAS - Nas Implementation: Integrated NAS - Gateway NAS - Integrated NAS Connectivity - Gateway NAS Connectivity - NAS File Sharing Protocols - NFS, CIFS-NAS I/O Operations - Hosting and Accessing Files on NAS - Factors Affecting NAS Performance and Availability - Content Addressed Storage: Fixed Contents and Archives - Types of Archives - Features and Benefits of CAS CAS Architecture - Object Storage and Retrieval in CAS - CAS Example - Healthcare Solution : Storing Patient Studies.

Unit-V: Storage Virtualization, Backup and Recovery: (12)

Forms of Virtualization: Memory Virtualization - Network Virtualization - Server Virtualization - Storage Virtualization-SNIA Storage Virtualization Taxonomy Storage Virtualization Configuration - Storage Virtualization Challenges - Scalability - Functionality - Manageability - Support - Types Of Storage Virtualization: Types of Storage Virtualization - Block-Level Storage Virtualization - File Level Virtualization - Backup And Recovery: Backup Process - Disaster Recovery - Operational Back Up - Archival - Backup Consideration - Backup Granularity - Recovery Considerations - Backup

Methods - Backup Process - Backup And Restore Operations - Backup Topologies - Serverless Backup - Backup in NAS Environment - Backup Technologies - Backup to Tape - Physical Tape Library - Backup to Disk - Virtual Tape Library.

Book for Study

1. G. Somasundaram and Alok Shrivatsava, "Information Storage Management: Storing, Managing, and Protecting Digital Information", Wiley, 2009.

Book for Reference

1. Ulf Troppens et al, "Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, ISCSI, INFINIB and FOCE", Wiley, 2015.
2. Hubbert Smith, "Data Center Storage: Cost-effective strategies, implementation and management", CRC Press, 2011.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Code 17PCA4203B					Title of the Paper INFORMATION STORAGE AND MANAGEMENT								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	2	4	4	2	4	2	4	2	3	2	5		3.3
CO2	4	3	3	3	4	5	2	3	4	2	4	1	3		3.1
CO3	2	5	2	3	3	2	2	2	4	2	3	2	4		2.9
CO4	3	3	3	4	4	3	3	2	2	1	2	3	4		2.8
CO5	4	5	3	2	3	4	2	2	5	3	2	2	3		3.1
CO6	5	4	2	3	4	5	4	4	2	2	3	3	3		3.4
CO7	4	5	2	2	3	3	3	3	2	3	2	2	5		3.0
CO8	4	3	2	4	3	5	2	3	5	2	3	5	3		3.4
														Overall Mean Score for COs	3.1

Result: The Score for this Course is 3.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Totalof Values}}{\text{TotalNo.of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 4**
17PCA4203C **Credits : 4**

Core Elective-III
LINUX ADMINISTRATION

Course Outcomes:

1. Gain basic knowledge on Linux Introduction and Installation.
2. Understand the Administration and Setting Up and Supporting users
3. To learn the Security Issues
4. Get to know the Networking and Connecting to Internet
5. To understand the Setting Up File Server
6. To learn the usage of Web Servers

Unit-I: (12)

Linux Introduction and Installation: Linux-Advantages-Red Hat Linux- New Features-Installation procedures and Methods. Using Desktop-GNOMEKDE-Linux Commands Accessing and Running Applications-Installing Red Hat Linux Applications, Running Window Application, Running Windows, DOS and Macintosh Applications - Tools for using Internet and Web.

Unit-II: (12)

Administration: Understanding System Administration: Root login super user-GUI tools, commands and Log files-Configuring Hardware-File System and Disk Management-Monitoring performances. Setting Up and Supporting users: Creating user accounts - Setting user defaults - Creating Desktops Modifying and Deleting Accounts.

Unit-III: (12)

Security Issues: Hacker versus Cracker-Password Protection-Protection from break-in-Filtering Network Access-Firewalls- Detecting Instructions - Encryption techniques.

Unit-IV: (12)

Setting up a LAN- LAN- Wireless-LAN- Understanding IP Addresses. Connecting to Internet: Dial up connection- Red Hat Linux as a router-VPN connection-Red Hat Linux as a proxy server-proxy clients.

Unit-V: (12)

Setting Up File Server: Setting up- NFS- Netware File Server Setting up a Web Server: Web Server- Starting Apache Web Server -Configuring Apache Server -Starting and Stopping the Server - Monitoring Activities.

Book for Study

1. Christopher Negus “Red Hat Linux 9 Bible”, John Wiley & Sons, 2005.

Book for Reference

1. Thomas Schenk, “Red Hat Linux System Administration”, Techmedia, New Delhi, 2003.
2. Christopher Negus “Red Hat Linux 9 Bible”, Wiley Dreamtech, India Pvt. Ltd., New Delhi, First Edition, 2003.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Code 17PCA4203C			Title of the Paper Core Elective-III: LINUX ADMINISTRATION									Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	3	3	3	3	4	3	3	3	3	3	4	2	3.15
CO2	4	4	3	3	4	4	3	3	3	2	3	4	2	3.23
CO3	4	4	3	3	4	4	3	3	3	4	3	4	2	3.38
CO4	4	4	3	4	4	4	3	3	3	3	3	4	2	3.30
CO5	4	4	4	3	4	4	4	3	3	4	4	4	2	3.46
CO6	3	3	3	4	3	4	4	3	3	3	3	4	2	3.23
													Overall Mean Score for COs	3.29

Result: The Score for this Course is 3.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semester IV **Hours/Week: -**
17PCA4124 **Credits : 2**

DOMAIN STUDY

Course Outcomes:

1. To acquire knowledge and skills based on existing study
2. Identify various domains like Banking, Finance, Health Care, Job portal and Insurance
3. Be Ability to analyze sub-domain which is the part of different domain
4. Ability to have clear outline about specific area to which the project belongs
5. Capable of gathering information about the nature of domain
6. Efficiently analyze the gathered information and provide detail report.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Code 17PCA4124					Title of the Paper DOMAIN STUDY								Hours -	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	3	4	5	4	4	4	4	4	3	3	2		3.6
CO2	5	4	4	4	4	4	4	4	4	3	4	2	3		3.7
CO3	4	3	3	3	4	3	3	3	3	3	3	3	2		3.0
CO4	4	4	4	4	4	4	4	4	3	3	3	2	2		3.6
CO5	4	3	3	4	4	4	3	3	3	4	4	3	2		3.3
CO6	4	5	4	5	4	3	3	4	3	3	4	3	3		3.6
Overall Mean Score for COs															3.4

Result: The Score for this Course is 3.4 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 4**
17PCA5125 **Credits : 3**

DISTRIBUTED TECHNOLOGIES

Course Outcomes:

1. To understand Distributed technologies
2. To understand Distributed technologies Architecture
3. To understand Distributed technologies with Java RMI, J2EE, SERVLET, and DOT NET
4. Ability to have clear outline about specific area to which the project belongs
5. Capable of gathering information based on the nature of database management systems.
6. To understand to access databases thru above mentioned technologies.

Unit-I: (12)

Client server architecture: 2-tier model - 3-tier model - n-tier model - J2EE architecture - DOTNET architecture - MVC architecture.

Unit-II: (12)

Presentation services: JSP - Javamail - Interaction services: - CORBA-XML-XSL.

Unit-III: (12)

Component model: EJB : Session Beans: Stateless and Stateful - Entity Beans-CMP and BMP - Message Driven Beans.

Unit-IV: (12)

ASP.NET : Introduction - architecture - ASP.NET Runtime - ASP.NET Parser-Assembly - Page class. Web Server Controls - HTML Controls-AdRotator and Calendar controls - Validation Controls - Security Management.

Unit-V: (12)

ADO.NET: System. Data, Sql Client and Xml namespaces - Provider objects and Consumer objects - Disconnected data access-Grid View & Form View.

Books for Study:

Unit I, II

1. Justin Couch, Daniel H.Steinberg, “J2EE Bible”, Wiley India(P) Ltd, New Delhi, 2002.

Unit III

2. Paul Tremblett, “Instant Enterprise Java y - Beans”, Tata McGraw Hill Publishing company, New Delhi, 2001.

Unit IV,V

3. Platt S David, “Introducing Micorsoft .Net”, Prentice Hall of India, New Delhi, 2003.

Books for Reference:

1. Stephanie Bodoff, Dale Green, Eric Jendrock, “The J2EE tutorial”, Addison-Wesley, 2002.
2. Hitesh Seth, “Microsoft .NET: kick start”, Sams Publishing, 2004.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Code 17PCA5125					Title of the Paper DISTRIBUTED TECHNOLOGIES								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	3	4	4	3	4	3	4	3	4	3	4		3.5
CO2	4	4	3	4	4	4	4	4	3	3	3	3	3		3.6
CO3	4	4	2	4	4	4	4	4	4	4	4	4	4		3.8
CO4	3	4	4	4	3	4	3	4	3	4	3	4	3		3.5
CO5	4	4	3	4	4	4	4	4	3	3	3	3	3		3.5
CO6	4	4	2	4	4	4	4	4	4	4	4	4	4		3.8
														Overall Mean Score for COs	3.6

Result: The Score for this Course is 3.6 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 4**
17PCA5126 **Credits : 3**

SOFTWARE ENGINEERING

Course Outcomes:

1. To acquire knowledge in various software development models
2. Extract and analyze software requirements specifications for different projects
3. Develop skills in basic architecture/design and apply standard coding practices
4. Ability to define the basic concepts and importance of software project management concepts like cost estimation, scheduling and reviewing progress
5. Identify and implement of the software metrics
6. Apply different testing and debugging techniques and analyzing their effectiveness
7. Critically analyse and provide recommendations to improve the operations of the development of the project
8. Demonstrate the need for appropriate decision making, control and performance evaluation of a project.

Unit-I: (12)

Introduction to Software Engineering: The Evolving Role of Software-Software-The changing nature of software-Software Myths. A generic View of Process: A Layered technology-process models: The Waterfall Model-Evolutionary Process Models.

Unit-II: (12)

System Engineering: Computer-Based Systems-The System Engineering Hierarchy. Requirement Engineering: Requirements Engineering Tasks-Initiating the Requirement Engineering Process-Eliciting Requirements-Building the Analysis Model-Requirement Analysis-Data Modeling Concepts-Flow Oriented Modeling-Class based Modeling-Creating Behavior Model.

Unit-III: (12)

Design Engineering: Design process and Design Quality-Design Concepts-The Design Model. Creating the Architectural Design: Software Architecture-Data Design-Architectural Design-Mapping Data Flow into Software Architecture. Modeling component level design: Designing class based components-Performing User Interface Design: The Golden Rules-User

Interface Analysis and Design-Interface Analysis-Interface Design Steps-Design Evaluation.

Unit-IV: (12)

Testing Strategies: A Strategic Approach of Software Testing-Test strategies for Conventional Software and Object Oriented Software-Validation Testing-System Testing-The art of Debugging. Testing Tactics: Software Testing Fundamentals-White Box Testing-Basis Path Testing-Control Structure Testing-Block Box Testing-Object Oriented Testing Methods.

Unit-V: (12)

Project Management: The Management Spectrum-The People-The Product-The Process-The Project. Estimation: The Project Planning Process-Resources-Software Project Estimation-Decomposition Techniques-Empirical Estimation Models. Project Scheduling: Project scheduling-Scheduling. Quality Management: Quality Concepts-Software Quality Assurance-Formal Technical Reviews.

Book for Study

1. Roger S. Pressman, “Software Engineering”, McGraw Hill, International 8th Edition, New York.

Book for Reference

1. Richard Fairley, “Software Engineering Concepts”, McGraw Hill, International Edn 2014.
2. Rajib Mall, “Fundamentals of Software Engineering”, PHI, New Delhi, 2014.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Code 17PCA5126					Title of the Paper SOFTWARE ENGINEERING								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	3	3	4	4	4	4	4	5	3	4	3	2	3.5	
CO2	3	3	4	4	3	4	4	4	4	3	4	2	3	3.4	
CO3	4	4	3	3	4	4	4	3	4	3	3	3	4	3.5	
CO4	2	4	3	3	3	3	2	4	3	3	3	4	4	3.1	
CO5	4	4	3	3	4	3	4	4	3	3	3	4	4	3.5	
CO6	4	4	4	3	5	4	3	4	3	3	3	2	1	3.3	
CO7	4	3	4	4	4	2	3	3	4	3	4	4	2	3.3	
CO8	4	3	3	4	4	2	3	3	4	3	4	4	2	3.3	
Overall Mean Score for COs														3.3	

Result: The Score for this Course is 3.3 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 4**
17PCA5127 **Credits : 3**

BIG DATA AND CLOUD COMPUTING

Course Outcomes:

1. Ability to appreciate the concepts of Cloud Computing and their applications.
2. Ability to develop business integrated services in cloud computing.
3. Ability to appreciate the concepts and features of Big Data.
4. Ability to become a Big Data Analytics.
5. Ability to Saving, Storing and Retrieving Work in R.
6. Ability to utilize the graphical representation for data in R
7. Ability to carry out appropriate statistical tests using R.
8. Ability to solve statistical problems using R.

Unit-I: (12)

Introduction to Cloud Computing: Roots of Cloud Computing-Layers and Types of Cloud-Features of a cloud- Cloud Infrastructure Management-Infrastructure as Service providers-Platform as a Service providers-Challenges and Risks. Migrating into a Cloud: Introduction - Broad Approaches-Seven Step Model.

Unit-II: (12)

Integration as a Service: Introduction-Evolution of SaaS-Challenges of SaaS Paradiam-Approaching the SaaS Integration Enigma-Integration Methodologies-SaaS Integration products and platforms-SaaS Integration Services-Businesses - to- Business Integration services-SaaS integration appliances - A Framework of Sensor-Cloud Integration. The Enterprise Cloud Computing Paradigm: Introduction-Issues for Enterprise Applications on the Cloud-Transition Challenges - Enterprise Cloud Technology and Market Evolution.

Unit-III: (12)

Introduction to Big Data: Classification of Digital Data - Characteristics of Data - Evolution of Big Data - Definition of Big Data - Challenges with Big Data-Concept of Big Data - Traditional Business Intelligence (BI) versus Big Data. Big Data Analytics: Classification of Analytics - Data Science - Data Scientist - Few Top Analytics Tools. Big Data Technology Landscape: NoSQL (Not OnlySQL)-Hadoop.

Unit-IV: (12)

Introduction to R: R as a Statistical Software and Language-R as a Calculator-R Preliminaries-Methods of Data Input-Data Accessing or indexing-Built-in Functions –Graphics With R-Saving, Storing and

Retrieving Work.

Unit-V: (12)

Descriptive Statistics: Diagrammatic Representation of Data-Graphical representation of data-Measures of central tendency.

Books for Study:

1. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, "Cloud Computing: Principles and Paradigms", Published by John Wiley & Sons, Inc., 2011. (Units I and II)
2. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", Wiley India Pvt. Ltd., 2016. (Unit III)
3. Sudha G. Purohit, Sharad D. Gore, Shailaja R. Deshmukh, "Statistics Using R", Narosa Publishing House Pvt.Ltd., 2nd Ed., 2015. (Units IV and V)

Book for References:

1. Kris Jamsa, "Cloud Computing", Published by Jones and Baretlett Learning, 2013.
2. Soumendra Mohanty, Madhu Jagadeesh, and Harsha Srivatsa, "Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics", Apress Publication, 2013.
3. Judith Hurwitz, Alan Nugent, Dr. Fern Halper And Maricia Kaufman, "Big Data For Dummies",Wiley India Pvt. Ltd., 2013.
4. Roger D. Peng, "R Programming for Data Science", Lean Publishing, 2015.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Code 17PCA5127	Title of the Paper BIG DATA AND CLOUD COMPUTING											Hours 4	
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	4	2	4	4	3	3	3	4	3	4	4	2	
CO2	4	3	2	3	4	4	4	4	4	3	4	4	2	
CO3	3	3	1	3	3	3	4	4	4	3	4	4	1	
CO4	4	4	2	4	4	4	4	4	4	4	3	4	2	
CO5	3	3	1	3	3	3	3	3	4	3	3	4	1	
CO6	3	3	1	4	4	4	4	3	4	4	3	4	2	
CO7	4	3	1	3	4	4	4	4	3	4	3	4	3	
CO8	4	4	3	4	4	4	3	4	4	3	4	4	3	
										Overall Mean Score for COs				

Result: The Score for this Course is 3.4 (Very High)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 4**
17PCA5128 **Credits : 3**

OPERATIONS RESEARCH

Course Outcomes:

Upon successful completion of this subject, the student will be able to:

1. Formulate real life Problems as LP Model and finding an optimized solution, different methods of Solving LP Model
2. Know the concept of solving Transportation Problems and Assignment Problem with Business Solutions
3. Know the Primal Dual Relationship as Producer and Consumer relationship in business
4. Identify the activities, schedule the Project and finding time of completion.
5. Critically identifying the important activities which need attention during development of Projects.
6. Know the importance of Queue and its applications to various real life examples, identifying the critical elements in the Queuing Theory
7. Understand the need of inventory and models for different products
8. Perform inventory analysis in selected product methods.

Unit-I: (12)

Linear Programming : Formulations and Graphical solution to L.P. Problem Simplex method-Degeneracy, Unbounded and infeasible solution– Two Phase Method.

Unit-II: (12)

Linear Programming(contd):Duality-Primal and Dual Computations –Dual Simplex Method - Transportation problem and its solution-Assignment problem and its solution by Hungarian method.

Unit-III: (12)

Project scheduling by PERT - CPM : Phases of project scheduling –Arrow Diagram - Critical Path Method - Probability Considerations in Project Scheduling.

Unit-IV: (12)

Queueing Theory : Queueing System - Characteristics of Queueing system - classification of queues - Poisson Queues - M/M/1 and M/M/C Queueing Models.

Unit-V: (12)

Inventory Management : Inventory Control - ABC analysis - Economic Lot size Problems - EOQ with uniform Demand and shortages - Limitations of inventories - Buffer stock - Determination of Buffer stocks.

Note: Stress to be on solving Numerical Problems only.

Book for Study

1. Kanti Swarup, P K Guptha and Man Mohan, “Operations Research”, Sultan Chand & Sons, New Delhi, 2013.

Books for Reference

1. Hamdy A. Taha, “Operations Research-An Introduction”, Macmillan Publishing Co, 5th Edition, 1987.
2. P.K.Gupta, Man Mohan, “Operations Research and Quantitative Analysis”, Sultan Chand & Sons, New Delhi First Edition, 1987.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Code 17PCA5128					Title of the Paper OPERATIONS RESEARCH								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	4	4	4	3	3	4	4	5	3	3	2		3.5
CO2	4	3	4	4	4	4	3	3	3	4	3	3	2		3.4
CO3	4	4	4	4	4	3	3	3	3	5	3	3	2		3.5
CO4	4	4	4	4	4	3	2	2	3	5	3	3	2		3.3
CO5	4	4	4	4	4	3	2	2	3	5	3	3	2		3.3
CO6	4	4	4	3	4	3	2	2	3	5	3	3	2		3.2
CO7	4	4	4	4	4	3	3	3	3	5	3	3	2		3.5
CO8	4	4	4	4	4	3	2	2	2	5	3	3	2		3.2
Overall Mean Score for COs															3.4

Result: The Score for this Course is 3.4 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 4**
17PCA5129 **Credits : 3**

COMPILER DESIGN

Course Outcomes:

1. To introduce the various phases of a compiler
2. To give the basic ideas on automata theory
3. To know the various parsing techniques.
4. To impart the code optimization techniques
5. To know the structure and various phases of compiler
6. To implement lexical analyzer
7. To know the basic parsing techniques
8. To develop skills in generating intermediate code

Unit-I: (12)

Different phases of a compiler - Finite state automaton and Lexical analysis - A simple approach to the design of lexical analyzers - Regular expressions NFA-DFA-reduced DFA- implementation of lexical analyzer- A language for specifying lexical analyzers.

Unit-II: (12)

Context free grammars - Parsers - Derivation and Parse trees - Shift - reduce parsing - Operator-precedence parsing - Top-down parsing - Predictive parsers.

Unit-III: (12)

Intermediate code generation - Translation - Implementation of syntax - directed translators - Intermediate code - Postfix notation - Parse trees and Syntax trees - Three-address codes - Quadruples and Triples - Translation of assignment statements.

Unit-IV: (12)

Symbol tables - Data structures for symbol tables - Implementation of a simple stack allocation scheme - Implementation of block structured languages - Errors - Lexical phase error.

Unit-V: (12)

Code optimization and Code generation: Elementary code optimization technique - Loop optimization - DAG representation of basic blocks - Value numbers and Algebraic laws - Object programs - Problems in code generation - A Machine model - A simple code Generator.

Book for Study

1. Alfred V. Aho, Jeffery D.Ullman, "Principles of Compiler Design", Narosa Publishing House, New Delhi, 1985.

Books for Reference

1. William A.Barrett, Rodney M.Bates, David A.Gustafson and John D.Couch-"Compiler Construction Theory and Practice", Galgotia Publishing Co., 1990.
2. Jean-Paul Trembley and Paul G. Sorenson,- "The Theory and Practice of Compiler Writing", McGraw Hill,1985.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Code 17PCA5129					Title of the Paper COMPILER DESIGN								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	3	1	4	4	3	4	4	3	4	3	2		3.2
CO2	4	4	3	2	4	4	3	2	4	2	4	4	2		3.2
CO3	4	4	3	1	4	4	3	4	4	3	3	4	2		3.3
CO4	4	3	4	1	4	4	4	4	4	3	4	3	2		3.4
CO5	4	3	4	1	3	3	3	4	4	3	4	4	2		3.2
CO6	4	3	3	2	4	4	4	3	4	3	4	4	2		3.4
CO7	4	3	4	2	3	3	4	3	3	2	3	3	2		3.0
CO8	4	3	3	2	3	3	4	3	3	3	3	4	2		3.1
														Overall Mean Score for COs	3.2

Result: The Score for this Course is 3.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 3**
17PCA5130 **Credits : 2**

Software Lab-IX
DISTRIBUTED PROGRAMMING

1. JSP - use of scriptlet.
2. JSP - use of java beans.
3. EJB - Session Bean.
4. EJB - Entity Bean.
5. ASP.NET - Server & Client side controls.
6. ASP.NET and ADO.NET - use of disconnected data object.
7. ASP.NET: Data bind Controls.
8. DOM usage on the server side.
9. AJAX: Dynamic client - server interaction example.

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Semester V **Hours/Week: 3**
17PCA5131 **Credits : 2**

Software Lab-X
R PROGRAMMING

1. Built in functions
2. Data Frames and Matrices
3. Accessing Data and Indexing
4. Diagrammatic representation of data
   a) Plotting data
   b) Bar chart and its varieties
   c) Bar plot
   d) Pie chart
   e) Stem-and –Leaf plot
5. Frequency distribution
6. Graphical representation of data
   a) Rod-spike graph
   b) Histogram
   c) Frequency polygon
7. Measures of central tendency functions
8. Simple R programs

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Semester V **Hours/Week: -**
17PCA5132 **Credits : 2**

COMPREHENSIVE EXAMINATION

Course Outcomes

1. Solve the problems using c and object oriented programming languages.
2. Familiar with Operating Systems and smart devices operating systems.
3. Solve the problems using Data Structures Algorithms Discrete Mathematics and Operations Research
4. Comprehend the concepts and practices of Networking and Android programming

Unit-I

C Debugging - Object Oriented Programming.

Unit-II

Operating Systems - Smart Devices Operating Systems.

Unit-III

Data Structures - Algorithms - Discrete Mathematics and Applications of Operations Research.

Unit-IV

Database Concepts - Software Engineering.

Unit-V

Web Technologies - Networking - Android programming.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Code 17PCA5132				Title of the Paper COMPREHENSIVE EXAMINATION								Hours -	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	4	4	3	3	5	4	2	3	2	4	5	4	3.6
CO2	4	3	5	4	5	3	4	5	4	1	4	4	4	3.8
CO3	4	4	5	3	4	4	5	3	5	2	4	3	4	3.8
CO4	5	5	4	4	3	5	4	5	4	3	4	5	4	4.3
Overall Mean Score for COs														3.8

Result: The Score for this Course is 3.8 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 4**
17PCA5134 **Credits : 2**

INTERVIEW PREPARATION & MANAGERIAL SKILLS

Course Outcomes

1. To bring out the latent talents and thinking capacity of each student and to help them grow in personality.
2. To help the students think out of box, out of convention.
3. To help the students grow in leadership qualities.
4. To help the students to stay motivated at difficult and negative environment and to keep focused to win the race in life.

Unit-I: Thinking Strategies (12)

Strategic thinking - meaning - questions - thinks included in Strategic thinking - Process consideration in Strategic thinking - Strategic thinking competencies - importance of /Strategic thinking. Lateral Thinking - meaning - why Lateral Thinking - when to use Lateral Thinking - Benefits of Lateral Thinking - Techniques used in Lateral Thinking - Who needs Lateral Thinking - How to use Lateral Thinking?-Conventional Vs Lateral Leaders - Questions asked by Lateral Leaders - becoming a Lateral leader.

t-II: Interpersonal Strategies: (12)

Conflict Resolution - meaning - points to be understood before studying conflict resolution - sources of conflict - common reactions to conflict-role of perception in conflict - steps for Conflict Resolution - Conflict handling matrix - Functional and Dysfunctional outcome of conflict. Negotiation skills - process - styles - outcome - principles involved - negotiation model - being a negotiator - qualities of negotiator.

Unit-III: Impact of Resistance: (12)

Reasons for Resistance - Types of people in facing changes-introducing change. Facing challenges - meaning - importance - path to facing challenges - benefits of facing challenges.

Unit-IV: Action Based Strategies (12)

Risk taking - meaning - factors determining Risk Taking - Risk Management - users of Risk Management - Steps in Risk Management. Effective decision making - meaning - approaches - methods - steps-Decision making at the work place.

Unit-V: Behavioural Strategies (12)

Motivation and Staying motivated - meaning - finding reason for being motivated - staying motivated at work place - staying motivated in negative work environment - staying motivated during crisis Balancing work and life - meaning - work satisfaction - gender differences - responsibility of the employers and employees - ways of balancing work and life - handling professional and personal demands - organizing your desk

Books for Study

1. Alex, K. "Managerial Skills", S.Chand & Co Ltd., New Delhi.

Books for Reference

1. Meena, K. and Ayothi, V. "A book on development of Soft Skills".
2. Daniel Goleman, "Emotional Quotient".
3. Norman Vincent Peale, "Power of the Plus factor".
4. Stephen Covey, "The Seven Habits of Highly Effective People".

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Code 17PCA5134					Title of the Paper INTERVIEW PREPARATION & MANAGERIAL SKILLS								Hours 4	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	4	3	2	3	4	3	3	4	3	4	3		3.3
CO2	2	2	2	2	2	4	4	4	3	5	4	4	3		3.3
CO3	4	4	4	4	4	3	4	4	5	4	3	5	2		3.8
CO4	3	3	3	3	3	3	3	3	2	5	3	4	2		3.1
Overall Mean Score for COs															3.4

Result: The Score for this Course is 3.4 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **Hours/Week: 30**
17PCA6135 **Credits : 20**

PROJECT

The entire sixth semester is allotted to do a project work in an organization with sufficient infrastructure to carry out the MCA project work. The students would choose an organization and submit the details of the organization to the project guide and HoD. The students should send a requisition letter from the HoD to the organization and should get the letter of acceptance from the organization.The students can send only one such requisition letter at a time. Only after non-acceptance of the company the student can request another organization for doing the project work. The guide and HoD have to approve the company / organization and in case of any change suggested by the guide or HoD, the student should change the organization. The change would be suggested by the guide &HoD if they find the company not having sufficient infrastructure for computing and an external guide in the organization with required educational qualification such as MCA or ME / MTech who can be external guides in the organization. Only upon the receipt of the acceptance letter, the student will be relieved from the College to join the company.They should submit the acceptance letter from the organization for having accepted the student for pursuing his/her MCA project work. The marks awarded by the external guide in the organization carries a weightage of ten percent.

The students would join the organization at the start of the sixth semester and send their joining report on or before the fixed date as fixed by the Department. The students will be supplied with all the details of what are to be done before and after joining the company. They should appear for first review during the mid-semester examinations and they will report the progress of their project work in the presence of their classmates and guide.

The students should send emails to their guides every fifteen days of their progress after joining the organization. Failure to submit the joining report and failure to be present for the first review (except under exempted circumstances by the Department of Computer Science due to long distance) will result in non-acceptance of their project work and such students would repeat the same procedure in the next academic year with the approval of the Principal, Controller of Examinations and the Department of Computer Science after the payment of the fees of the particular semester.

The students appear for the second review during the end semester examinations in the college along with the manuscript of the project work. The manuscript should be prepared along the guidelines supplied to them by the Department; students should submit three volumes to the Department before the date stipulated by the Department. The viva-voce of the project work would be conducted by both the internal and the external examiners along with semester examinations of the College.