



PSGR Krishnammal College for Women



DEPARTMENT OF BCA

**CHOICE BASED CREDIT SYSTEM &
OUTCOME BASED EDUCATION SYLLABUS**

BACHELOR OF COMPUTER APPLICATIONS

2020-2023



PROGRAMME OUTCOMES - UG

After completion of the programme, the student will be able to

- PO1:** Design and Develop computer based systems with strong foundation in fundamentals and clarity on both conceptual and application oriented skills of various domains.
- PO2:** Spark the reflective thinking process in various areas like information computing sectors, teaching and innovative researches.
- PO3:** Work independently on a substantial software projects and as an effective team member.
- PO4:** Inculcate the self directed learning in emerging technologies to upgrade them.
- PO5:** Engaged in lifelong learning to equip them to the changing environment and be prepared to take up mastering programmes.

PROGRAMME SPECIFIC OUTCOMES

- PSO1:** The students will obtain an attitude to understand the societal issues and apply the acquired programming skills to develop system-based application.
- PSO2:** Students are capable to comprehend the technological advancements in the usage of modern tools to satisfy industry needs.
- PSO3:** A strong foundation to pursue higher education in the fields of teaching and research.

DEPARTMENT OF BCA
CHOICE BASED CREDIT SYSTEM & OUTCOME BASED EDUCATION
SYLLABUS & SCHEME OF EXAMINATION
2020-2023-BATCH

Semester	Part	Subject Code	Title of paper	Instruction hours / week	Contact Hours	Tutorial hours	Duration of Examination	Examination Marks			Credits
								CA	ESE	Total	
I	I	TAM2001/ FRE1901/ HIN1901	Language I	6	86	4	3	40	60	100	3
	II	ENG2001/ ENG20F1	English Paper I / Functional English Paper I	6	86	4	3	40	60	100	3
	III	PP20C01	Core – 1: Programming in C	4	56	4	3	40	60	100	4
		PB20C02	Core – 2 : Bioinformatics	3	41	4	3	40	60	100	3
		AP20CP1	Programming Lab – 1: C Programming Lab	3	45	-	3	40	60	50*	2
		TH20A03	Allied 1: Allied : Numerical and statistical Techniques	6	86	4	3	40	60	100	5
	IV	NME18ES NME19A1/ NME19B1	Introduction to Entrepreneurship / Advance Tamil / Basic Tamil	2	28	2	2	50	50	100	2
II	I	TAM2002/ FRE2002/ HIN2002	Language II	6	86	4	3	40	60	100	3
	II	ENG2002/ ENG20F2	English Paper II/ Functional English Paper II	6	86	4	3	40	60	100	3
	III	AP20C03	Core – 3 : Object Oriented Programming with C++	5	71	4	3	40	60	100	5
		AP20CP2	Programming Lab –2: C++ & BioPerl Programming Lab	5	75	-	3	40	60	50*	3
		TH20A06	Allied 2: Allied : Discrete Mathematics	6	86	4	3	40	60	100	5
	IV	-	Open Course: (Self study- Online Course)	-	-	-	-	-	-	-	Grade
		NME19A2/ NME19B2	**Advance Tamil/ Basic Tamil	2	-	-	-	50	50	100	2
		REG16EE	Effective English Communication	2	-	-	2	50	50	100	2
		NM12GAW	General Awareness	Self Study	-	-	Online Test	100	-	-	Grade

III	III	AP19C04	Core – 4: Operating Systems and Fundamentals – UNIX	5	71	4	3	40	60	100	4
		AP20C05	Core – 5: Data Structures with python	5	71	4	3	40	60	100	4
		PDB2003	Core – 6: Database Management Systems	5	71	4	3	40	60	100	4
		AP20CP3	Programming Lab-3: DBMS Lab	4	60	-	3	40	60	50*	2
		TH20A13	Allied A3: Optimization Techniques	6	86	4	3	40	60	100	5
III & IV	III	PR19SB01	Skill Based Subject: 1. Data Analytics - Level 1: R-Programming	3	43	2	2	25	75	100	4
		PD19SB01	2. OOSE - Level 1: Software Design Tools								
	VI	JOB1625	Job Oriented Course PHP / MY SQL	-	-	-	3	-	-	-	Grade
III	IV	NM14VHR	Value Education and Human Rights	2	26	4	-	100	-	100	2
IV	III	AP20C07	Core – 7: Digital Electronics and Microprocessor	5	71	4	3	40	60	100	4
		AP20C08	Core – 8: Computer Networks	5	71	4	3	40	60	100	4
		AP20C09	Core – 9: Java Programming	5	71	4	3	40	60	100	4
		AP20CP4	Programming lab – 4: Java & BioPerl Programming Lab	4	60	-	3	40	60	50*	3
	III	BP19A05	Allied A4: Paper I: Business Accounts								
		PD20A01	Paper II: Digital Marketing	6	86	4	3	40	60	100	5
		PM20A02	Paper III: M-commerce								
III & IV	III	PR19SBP1	Skill Based Subject: 1. Data Analytics – Practical I: R- Programming	3	45	-	2	40	60	100	2
		PD19SBP1	2. OOSE – Practical I : Software Design Tools								
IV	IV	NM10EVS	Foundational Course: Environmental Studies	2	26	4	-	100	-	100	2
	V		NSS / NCC / YRC / Sports & Games	-	-	-	-	-	-	100	1
		COM15SER	Community Oriented Service	-	-	-	-	-	-	-	Grade

*100 Marks converted into 50

** Outside regular class hours.

* The credits is applicable to candidates who takes up the advanced level course exam

QUESTION PAPER PATTERN

CORE & ALLIED PAPERS

Continuous Internal Assessment : 50 Marks

Section		Marks	Total
A	5 X 2 Marks	10	50
B	4 X 5 Marks	20	
C	2/3 X 10 Marks	20	

End Semester Examination : 100 Marks

SECTION		WORD LIMIT	MARKS	TOTAL
A	11/13 X 2 Marks (Open Choice)	One or two sentences	22	100
B	5/7 X 6Marks (Open Choice)	300 words	30	
C	4/6 X 12Marks (Open Choice)	600 - 800 words	48	

SKILL BASED SUBJECT

Continuous Internal Assessment : 25 Marks

SECTION		MARKS	TOTAL
A	4 / 6 X 4 Marks	16	25
B	1 / 2 X 9 Marks	9	

End Semester Examination : 50 Marks

SECTION		MARKS	TOTAL
A	4 / 6 X 5 Marks	20	50
B	2 / 3 X 15 Marks	30	

ADVANCED LEARNERS COURSE (ALC)

Continuous Internal Assessment : 25 Marks

SECTION		MARKS	TOTAL
A	4 / 6 X 4 Marks	16	25
B	1 / 2 X 9 Marks	9	

End Semester Examination : 75 Marks

SECTION		MARKS	TOTAL
A	5 / 8 X 5 Marks	25	75
B	5/8 X 10 Marks	50	

VALUE EDUCATION AND HUMAN RIGHTS / WOMEN STUDIES / AMBEDKAR STUDIES / GANDHIAN STUDIES / ENTREPRENEURSHIP / ENVIRONMENTAL STUDIES

Continuous Internal Assessment : 50 Marks

SECTION		MARKS	TOTAL
A	4 / 6 X 5 Marks	20	50
B	2 / 3 X 15 Marks	30	

Value Education and Human Rights & Environmental Studies two internal tests will be conducted for 50 marks each and the total marks secured will be equated to a maximum of 75 marks and 25 marks is allotted for project / group discussion / presentation of a report.

INFORMATION SECURITY

Continuous Internal Assessment : 40 Marks

SECTION		MARKS	TOTAL
A	5 / 8 X 2 Marks	10	40
B	6 / 8 X 5 Marks	30	

FIELD TRAINING

The students have the option to select any organization – Government / private like industry, R & D organizations, scientific companies, etc., in consultation with the staff co-ordinator & HoD. The students are to undergo training for a period of two weeks at the end of semester IV during vacation. The students must maintain a work diary and prepare report of the training undergone and submit the same to the HoD. On a stipulated date, there will be a viva-voce with internal examiners at the beginning of the semester V

MODE OF EVALUATION	MARKS	TOTAL
Attendance	10	100
Work Diary	15	
Report	50	
Viva-voce	25	

PROJECT

Individual Project and Viva Voce

A specific problem will be assigned to the students. The topic/area of work will be finalized at the end of IV semester, allowing scope for the students to gather relevant literature during the vacation. The research work will be carried out in the Industry. Viva Voce/presentation will be conducted by a panel comprising of HOD, internal examiners. A power point presentation by the student group will be evaluated on the basis of students' response to the questions.

Internal Assessment: 20 Marks

Review	Mode of Evaluation	Marks	Total
I	Selection of the field of study, Topic & Research Design	5	20
II	Literature Collection and Data Collection	10	
III	Analysis & Conclusion, Preparation of rough draft	5	

External Assessment : 80 Marks

Mode of Evaluation	Marks	Total
Project Report		
Relevance of the topic to academic / society	10	60
Objectives	10	
System Design	20	
Implementation of Results and Discussion	20	
Viva Voce		
Presentation	10	20
Discussion	10	

WEIGHTAGE ASSIGNED TO VARIOUS COMPONENTS OF
CONTINUOUS INTERNAL ASSESSMENT

Theory

	CIA I	CIA II	Model Exam	Assignment/ Class Notes	Seminar	Quiz	Class Participation	Library Usage	Attendance	Max. Marks
Core / Allied	5	5	6	4	5	4	5	3	3	40
SBS	5	5	15	-	-	-	-	-	-	25
ALC		10	15	-	-	-	-	-	-	25
Information Security	40	40		10		10				100

Practical

	Model Exam	Lab Performance	Regularity in Record Submission	Attendance	Maximum Marks
Core / Allied / SBS	12	20	5	3	40

RUBRICS

Assignment/ Seminar

Maximum - 20 Marks (converted to 4 marks)

Criteria	4 Marks	3 Marks	2 Marks	1 Mark
Focus Purpose	Clear	Shows awareness	Shows little awareness	No awareness
Main idea	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
Organisation: Overall	Well planned	Good overall organization	There is a sense of organization	No sense of organization
Content	Exceptionally well presented	Well presented	Content is sound	Not good
Style: Details and Examples	Large amounts of specific examples and detailed description	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

CLASS PARTICIPATION

Maximum - 20 Marks (converted to 5 marks)

Criteria	5 Marks	4 Marks	3 Marks	2 Marks	1 Mark
Level of Engagement in Class	Student proactively contributes to class by offering ideas and asks questions more than once per class.	Student proactively contributes to class by offering ideas and asks questions once per class	Student contributes to class and asks questions occasionally	Student rarely contributes to class by offering ideas and asking questions	Student never contributes to class by offering ideas
Listening Skills	Student listens when others talk, both in groups and in class. Student incorporates or builds off of the ideas of others.	Student listens when others talk, both in groups and in class.	Student listens when others talk in groups and in class occasionally	Student does not listen when others talk, both in groups and in class.	Student does not listen when others talk, both in groups and in class. Student often interrupts when others speak.
Behavior	Student almost never displays disruptive behavior during class	Student rarely displays disruptive behavior during class	Student occasionally displays disruptive behavior during class	Student often displays disruptive behavior during class	Student almost always displays disruptive behavior during class
Preparation	Student is almost always prepared for class with required class materials	Student is usually prepared for class with required class materials	Student is occasionally prepared for class with required class materials	Student is rarely prepared for class with required class materials	Student is almost never prepared for class.

QUIZ

Maximum - 20 Marks (converted to 4 marks)

MAPPING OF POs WITH COs

COURSE	PROGRAMME OUTCOMES			
	PO1	PO2	PO3	PO4
COURSE - PP20C01				
CO1	S	M	M	M
CO2	S	S	M	M
CO3	S	S	M	S
CO4	M	S	S	S
COURSE - PB20C02				
CO1	M	S	S	M
CO2	M	S	M	M
CO3	M	M	M	M
CO4	S	S	M	S
CO5	S	M	S	S
COURSE - AP20CP1				
CO1	S	M	M	M
CO2	S	M	M	M
CO3	S	M	M	S
CO4	S	M	M	M
COURSE - AP20C03				
CO1	S	S	S	M
CO2	M	M	S	M
CO3	M	S	S	S
CO4	S	S	S	S
COURSE - AP20CP2				
CO1	S	M	M	M
CO2	S	M	M	M
CO3	S	M	M	S
CO4	S	M	M	M

COURSE - AP19C04				
CO1	S	S	S	M
CO2	S	S	M	M
CO3	S	S	S	S
CO4	S	S	S	M
COURSE – AP20C05				
CO1	M	S	M	M
CO2	S	M	M	M
CO3	M	S	M	S
CO4	S	S	S	S
CO5	M	M	S	S
COURSE –PDB2003				
CO1	M	S	M	S
CO2	S	M	S	S
CO3	M	S	S	M
CO4	S	M	M	S
CO5	M	S	S	M
COURSE – AP20CP3				
CO1	M	S	S	S
CO2	S	M	S	M
CO3	S	S	M	S
CO4	M	S	S	S
CO5	S	M	S	M
COURSE– PR19SB01				
CO1	S	M	M	S
CO2	S	S	S	S
CO3	S	M	S	S
CO4	S	S	S	S
CO5	S	S	S	S

COURSE- PD19SB01				
CO1	S	M	M	M
CO2	S	S	S	M
CO3	S	S	S	S
CO4	S	S	S	S
CO5	S	S	S	S
COURSE -AP20C07				
CO1	S	S	S	M
CO2	M	M	S	M
CO3	M	S	S	S
CO4	S	S	S	M
CO5	M	M	S	S
COURSE - AP20C08				
CO1	S	S	S	M
CO2	M	M	S	M
CO3	M	S	S	S
CO4	S	S	S	M
CO5	M	S	S	S
CO6	M	S	S	S
COURSE -AP20C09				
CO1	S	S	S	S
CO2	S	M	M	S
CO3	S	S	M	S
CO4	S	S	S	S
CO5	S	M	S	M
COURSE - AP20CP4				
CO1	S	S	M	S
CO2	S	S	M	S
CO3	S	S	S	S
CO4	S	M	M	M

COURSE – PM20A02				
CO1	S	M	S	S
CO2	S	S	M	S
CO3	S	S	S	S
CO4	S	S	S	M
CO5	S	S	M	S
COURSE–PR19SBP1				
CO1	S	M	M	M
CO2	S	M	S	M
CO3	S	S	S	S
CO4	S	S	M	S
CO5	S	S	S	S
COURSE–PD19SBP1				
CO1	S	S	S	S
CO2	S	S	S	S
CO3	M	S	S	S
CO4	S	M	S	S
CO5	S	S	S	M

S- Strong; M-Medium; L-Low

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PP20C01	PROGRAMMING IN C	THEORY	56	4	-	4

Preamble

- This course introduces fundamental C programming constructs.
- It covers concepts such as arrays, structure, pointers and file handling methods.
- It provides technical skills to design and develop various applications.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify the logic behind the execution of various applications	K1
CO2	Understand the concepts of C programming	K2
CO3	Analyze and discover bugs in the program	K2
CO4	Apply the concepts to solve a real-time problems	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	M	M	M
CO2	S	S	M	M
CO3	S	S	M	S
CO4	M	S	S	S

S- Strong; M-Medium; L-Low

PROGRAMMING IN C – PP20C01

(56 Hours)

Syllabus

UNIT I:

(12 Hrs)

Overview of C –character set - C tokens - keyword & identifiers – constants – variables - data types – declarations of variables – arithmetic, relational, logical, assignment, conditional, bit wise, special, increment and decrement operators - arithmetic expressions - evaluation of expression - operator precedence & associatively - mathematical functions - reading & writing a character - formatted input and output.

UNIT II:

(11 Hrs)

Decision Statements: If, if else, switch, break, continue - the?: operator - the GOTO statement. – Loop Control Statements: Introduction – for, nested for loops – while, do-while statements – Arrays: one-dimensional - two dimensional - multidimensional arrays.

UNIT III:

(11 Hrs)

Character string handling - declaring and initialising string variables - reading strings from terminal - writing strings to screen - string handling functions - User-defined functions: need for user

defined functions – types of functions: calling a function category of functions - no arguments and no return values - arguments but no return values - arguments with return values – recursion.

UNIT IV:

(11 Hrs)

Structure definition: structure initialisation - comparison of structure variables - arrays of structures - arrays within structures. Pointers: understanding pointers - accessing the address of a variable - declaring and initialising pointers - accessing a variable through its pointers - pointers and arrays - pointers and character strings - pointers and functions.

UNIT V:

(11 Hrs)

File management in C: defining and opening a file - closing file - I/O operations on files - error handling during I/O operations - random access to files - command line arguments.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E. Balagurusamy	Programming In ANSI C	Tata Mc Graw Hill, 7 th Edition.	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Byron Gottfried	Programming with C	Tata McGraw Hill, 3 rd Edition.	2013
2	V. Rajaraman	Computer Programming in C	Prentice Hall of India Pvt Ltd, 1 st Edition.	2004
3	Smarajit Ghosh	Programming in C	Prentice Hall of India Pvt Ltd, 1 st Edition.	2004
4	Yashwvant Kanetkar	Let us C	BPB Publications, 13 th Edition.	2014
5	Martin J. Gentile	An Easy Guide to Programming in C	Create Space Independent Publishing Platform, 2 nd Edition	2012

Pedagogy

- Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

Course Designers

1. Mrs.G.Sangeetha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PB20C02	BIOINFORMATICS	THEORY	41	4	-	3

Preamble

- The course explores the areas of Bioinformatics like Sequencing, DNA and Protein Structure.
- To attain familiarized with Biological Databases.

Course Outcomes

On the successful completion of the course, student will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of Bioinformatics and its applications.	K1
CO2	Work on various Biological Databases.	K2
CO3	Illustrate about Similarity Searching	K2
CO4	Learn and working nature of sequence alignment.	K3
CO5	Experiment about Structure and visualization of Protein and DNA.	K3

Mapping with Programme Outcome

Cos	PO1	PO2	PO3	PO4
CO1	M	S	S	M
CO2	M	S	M	M
CO3	M	M	M	M
CO4	S	S	M	S
CO5	S	M	S	S

S – Strong; M – Medium; L – Low

BIOINFORMATICS – PB20C02

(41 HOURS)

Syllabus

UNIT I

(8 hrs)

Bioinformatics: Introduction to Bioinformatics – Goal – Scope – Applications – Limitations – DNA Sequence Analysis: Why analyses DNA? – Gene Structure & DNA Sequence – Features of DNA Sequence Analysis.

UNIT II

(8 hrs)

Introduction to Biological Databases: What is Database? – Types of Database – Biological Database – Pitfalls of Biological Database – Information retrieval from Biological databases.

UNIT III

(8 hrs)

Database Similarity Searching: Unique Requirements of database searching – Heuristic database searching – Basic local alignment search tool (BLAST) – FASTA – Comparison of FASTA & BLAST – Database searching with smith – waterman method.

UNIT IV**(8 hrs)**

Sequence Alignment: Pairwise Sequence Alignment:- Evolutionary basis – Sequence Homology versus Sequence Similarity- Sequence Similarity versus Sequence Identity – Methods. Multiple Sequence Alignment:- Scoring Function, Exhaustive Algorithms.

UNIT V**(9 hrs)**

Protein Structure Basics: Amino Acids- Peptide Formation-Secondary Structure - Tertiary Structure. Protein Secondary Structure Prediction: Secondary structure prediction for Globular Proteins. Tertiary Structure Prediction: Methods-Homology modeling. Protein Structure Visualization, Comparison and classification.

Text Books

S.no	Author	Title of book	Publisher	Year of publication
1	Jin Xiong	Essential Bioinformatics	Cambridge University Press	2016
2	T K Attwood & D J Parry Smith	Introduction to Bioinformatics	Pearson Education	2007

Reference Books

S.no	Author	Title of book	Publisher	Year of publication
1	Jean-Michel Claverie , Cedric Notredame	Bioinformatics – A Beginner's Guide	Wiley Computer Publishing	2009
2	ShubaGopal, Rhys Price Jones,PaulTymann,AnneHaake	Bioinformatics with fundamentals of Genomics and Proteomics”	Tata McGraw Hill	2010

Pedagogy

- Chalk and talk, PPT, Discussion, Assignment,Demo,Quiz

Course Designers

1. Mrs.M.Selvanayaki

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP20CP1	C PROGRAMMING LAB	PRACTICAL	-	-	45	2

Preamble

- To provide the hands on experience on C Programming and improve the practical skill set.
- The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction of C code.
- To know the steps involved in compiling, linking and debugging C code, feel more confident about writing the C functions, write some complex programs.

Course Outcomes

On the successful completion of the course, student will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify the basic terminologies of c programming by using different data types, decision structures, loops and functions.	K1
CO2	Understand the dynamics of memory allocation by the use of pointers and files.	K2
CO3	Understand the concepts of Structures and Unions	K2
CO4	Design and develop the simple business application.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	M	M	M
CO2	S	M	M	M
CO3	S	M	M	S
CO4	S	M	M	M

S- Strong; M-Medium; L-Low

C PROGRAMMING LAB – AP20CP1

(45 Hours)

List of Programs

- Using different operators.
- Control Structures.
- Using arrays.
- String handling functions.
- User defined functions.
- Structures.
- Pointers.
- Working with files.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Mrs.K.Geethalakshmi
2. Mrs.T.S.Anushya Devi
3. Mrs.A.Kavitha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP20C03	OBJECT ORIENTED PROGRAMMING WITH C++	THEORY	71	4	-	5

Preamble

- This subject is designed to provide the graduates with why and how of Object-oriented programming in C++.
- It also presents the concept of Object-oriented programming with a brief discussion on the important elements of Object-oriented programming analysis and design of systems with its Object-oriented programming capabilities.
- It provides all techniques of software development in the C++ Programming Language and demonstrates these techniques by the solution of a variety of problems.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable codes.	K1
CO2	Describe classes and objects written by other programmers when constructing their system.	K2
CO3	Implement exceptions and file handling for providing solutions to problems.	K2
CO4	Illustrate the object oriented design for small/medium scale Problems.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	S	S	M
CO2	M	M	S	M
CO3	M	S	S	S
CO4	S	S	S	S

S- Strong; M-Medium; L-Low

OBJECT ORIENTED PROGRAMMING WITH C++ - AP20C03

(71Hours)

Syllabus

UNIT I :

(15 Hrs)

Principles of object oriented programming: Basic concepts of object oriented programming – Benefits of OOPs – Applications of OOPs – Beginning with C++: What is C++ – Applications of C++ – C++ statements – Structure of C++ program.

Tokens, Expressions and Control structures: Tokens – Keywords – Identifiers – constants – Expressions and their types – Basic and user defined data types – operators in C++ – Operator overloading – Operator precedence – Control structures- Functions in C++.

UNIT II : (14 Hrs)

Classes and Objects: Specifying a class– Defining member function– Nesting of member functions– Private member functions– Arrays within a class – Static data members – Static member functions – Array of objects – Objects as function arguments – Friendly functions – Constructors and Destructors: Constructors – Parameterized constructors– Multiple constructors in a class – Constructors with default arguments – Copy constructors – Dynamic constructors – Destructors.

UNIT III : (14 Hrs)

Operator overloading– Type conversions. Inheritance: Defining derived classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract classes.

UNIT IV : (14 Hrs)

Pointers, Virtual functions and Polymorphism: Pointers – Pointers to Objects, this Pointer, Pointers to Derived classes- Virtual Functions. Managing console I/O operations: C++ streams – C++ stream classes – Unformatted I/O operations – Formatted console I/O operations. Working with files: Classes for file stream operations – Opening and closing a file – Detecting End of File- File pointers and their Manipulations.

UNIT V : (14 Hrs)

Templates: Class Templates – Class Templates with Multiple Parameters – Function Templates – Function Templates with Multiple Parameters. Exception Handling: Basics - Exception Handling Mechanism – Throwing Mechanism – Catching Mechanism.

Text Book:

S.no	Author	Title of book	Publisher	Year of publication
1	E.Balagurusamy	Object Oriented Programming with C++	Tata Mc Graw Hill Publications, 6 th Edition.	2013

Reference Books:

S.no	Author	Title of book	Publisher	Year of publication
1	Bjarne Stroustrup	The C++ Programming Language	Pearson Education, 4 th Edition.	2014
2	Rajesh K. Shukla	Object Oriented Programming in C++	Wilsey India Pvt.Ltd, 1st, Edition.	2008
3	Robert Lafore	Object Oriented Programming in C++	Galgotia Publications, Pvt Ltd, 4th Edition.	2001

4	Tony Gaddis, Judy Walfers, GodferyMuganda	Starting Out with C++: Early Objects	Addison-Wesley publication, 8th Edition.	2013
5	Mt Somashekara, Ds Guru, Hs Nagendraswamy,	Object Oriented Programming With C++	Prentice Hall Of India	2014

Pedagogy:

- Chalk and Talk, PPT, Discussion, Interactive Teaching, Self-questioning by students, Group discussion, Quiz.

Course Designer:

1. A.Kavitha
2. G. Sangeetha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP20CP2	C++ & BIO-PERL PROGRAMMING LAB	PRACTICAL	-	-	75	3

Preamble

- Hands on experience to the learners in C++ programming based on concept learned with program course.
- Implementation of OOP feature such as class, objects, inheritance, and polymorphism can be done.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify object oriented programming paradigm and the importance of it in software development.	K1
CO2	Understand algorithmic thinking and apply it to programming.	K2
CO3	Implement OOPS concept in developing simple applications using C++	K3
CO4	Implementing the techniques for Bio sequence and gene expression data.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	M	M	M
CO2	S	M	M	M
CO3	S	M	M	S
CO4	S	M	M	M

S- Strong; M-Medium; L-Low

C++ & BIO-PERL PROGRAMMING LAB – AP20CP2

(75 hours)

LIST OF PROGRAMS:

- Implementing Various Control Structures.
- Implementing Inheritance.
- Using functions.
- Using Pointers.
- Implementing Function Overloading.
- Constructors and Destructors.
- File Manipulation.
- To align the sequence using local BLAST.
- Write a script to search for genes from Genscan.
- Protein Sequence Generation

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Mrs.K.Geethalakshmi
2. Mrs.T.S.Anushya Devi
3. Mrs.A.Kavitha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP19C04	OPERATING SYSTEMS FUNDAMENTALS - UNIX	Theory	71	4	-	4

Preamble

- This subject is designed to provide the students with a thorough discussion of the fundamentals of operating system.
- To explore the various memory management scheme and to perform administrative task on UNIX servers.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify the systematic approach of the system	K1
CO2	Know the real time meaning of deadlock prevention and avoidance.	K2
CO3	Determine the efficiency of scheduling algorithms	K2
CO4	Perform administrative tasks on UNIX servers.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	S	S	M
CO2	S	S	M	M
CO3	S	S	S	S
CO4	S	S	S	M

S- Strong; M-Medium; L-Low

OPERATING SYSTEMS FUNDAMENTALS - UNIX – AP19C04 (71 hours)

Syllabus

UNIT I:

(14 Hrs)

Introduction: What is an operating system?-Early history –Process concepts: Introduction-Definition of process-process states –process state transitions – The Process Control Block – Operations on processes – Suspend and Resume - Interrupt processing – Semaphore – Deadlock & Indefinite postponement.

UNIT II:

(14 Hrs)

Real Storage –virtual storage organization: Introduction – Evolution of storage Organization – Virtual Storage – Virtual Storage Management: Introduction - Virtual storage management strategies-Page replacement strategies - Working sets-Demand paging –Page size.

UNIT III:**(14 Hrs)**

Job & processor scheduling: Introduction – Scheduling Levels - Pre-emptive vs. non pre-emptive scheduling-priorities-deadline scheduling-FIFO-RR-Quantum Size-SJF-SRT-HRN. Distributed computing: Classification of sequential & parallel Architecture –Pipelining – Vector Processing - Array processor –Dataflow computers-Multiprocessing-Fault tolerance.

UNIT IV:**(14 Hrs)**

UNIX - Getting started - Gaining Confidence: The Unix File System – Creating File-Indulging File Play. Listing Files & Directories – Directory Related Commands.

UNIT V:**(15 Hrs)**

Shell Programming- The First step: When to Use Shell Scripts – The First Shell Script- Interactive Shell Scripts - Shell Variables - Shell Keywords - Another Way of Assigning Values to Variables - Tips & Traps - Unchanging Variables-Wiping Out Variables - Positional parameters – Passing Command Line Arguments – Setting Values of Position Parameters – Displaying Date in Desired Format – Using Shift on Positional Parameters – Arithmetic in Shell Script – The Carriage Return – The Tab & The Backspace – Positioning The Cursor – Beep – Bold & Beautiful – The tput Command – Control Instructions in Shell.

Text Books

S.no	Author	Title of book	Publisher	Year of publication
1	Dietal.H.M	An introduction to operating system	Welsey pub company, 2 nd Edition	2005
2	Yashavant P. Kanetkar	UNIX Shell Programming	BPB Publication, 1 st Edition	2012

Reference Books

S.no	Author	Title of book	Publisher	Year of publication
1	Abraham Silberschatz, Peter Baer Galvin Gagne	Operating system Principles	Wiley Publishers, 7 th Edition	2008
2	Archer J harries	Operating System	Tata Mc Graw Hill 2 nd Edition	2011
3	Dborah S.Ray, Eric.J.Ray	Unix and Linux	Pearchpit press, 4 th Edition	2009
4	Randal K. Michael	Mastering Unix shell scripting	Wiley India, 2 nd Edition	2009
5	Ron Peters	Expert Shell Scripting	Apress	2009

Pedagogy

- Lecture, Discussion, Quiz, PPT

Course Designers

1. Mrs. S.Mohanapriya
2. Mrs. T.S. Anushya Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP20C05	DATA STRUCTURES WITH PYTHON	Theory	71	4	-	4

Preamble

- To get familiarize knowledge with designing an algorithm using data structures in Python.
- To articulate the essential components of data structures like Stack, Queue, List, Searching, Sorting, Merging and Trees.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
C01	Describe the basic components of elements in python	K1
CO2	Demonstrate how to search and sort	K3
CO3	Illustrate the use of Arrays and Linked List	K2
CO4	Identify the process of working on Stack and Queue	K2
CO5	Demonstrate how to work on Trees	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	M	S	M	M
CO2	S	M	M	M
CO3	M	S	M	S
CO4	S	S	S	S
CO5	M	M	S	S

S- Strong; M-Medium; L-Low

DATA STRUCTURES WITH PYTHON – AP20C05

(71 HRS)

Syllabus

UNIT 1:

(14 Hrs)

Basic Python Programming: Basic Program Elements – Control Statements - String and their Operations – Built in Python Collections and their Operations - Creating New functions – Catching Exceptions – Files and their Operations - Creating New Classes.

UNIT 2:

(15 Hrs)

Overview of Collections: Collection Types – Operations on Collections – Implementations of Collections – Measuring the efficiency of algorithms – Complexity Analysis – Search Algorithms – Basic sort Algorithms – Faster Sorting – An Exponential Algorithm – Recursive Fibonacci.

UNIT 3: (14 Hrs)

Arrays and Linked Structures: Array Data Structure – Operations on Arrays – Two – Dimensional Arrays – Linked Structures – Operations on Singly Linked Structures – variations on a link.

UNIT 4: (14 Hrs)

Overview of Stack - Using a Stacks – Three Application of Stacks – Implementation of Stacks – Queues: Overview of Queues – Queue interface and its use –Two Applications of Queues – Implementation of Queues – Priority Queues.

UNIT 5: (14 Hrs)

Trees: Overview of Trees – Why use a Tree –The shape of Binary Trees – Three common applications of Binary Trees - Binary Tree Traversals - Developing a binary search Tree – Recursive Descent Parsing and Programming Languages – An Array Implementation of Binary Trees.

Text Books

S.no	Author	Title of book	Publisher	Year of publication
1	Kenneth A. Lambert	Fundamentals of Python Data Structures	Cengage Learning	-

Reference Books

S.no	Author	Title of book	Publisher	Year of publication
1	Ellis Horowitz & Sartaj Sahani	Fundamentals of Data Structure	Galgotia Book Source, 1 st Edition	2003
2	Rance D Ncaise	Data Structures and Algorithms using Python	John willey & sons,	2011

Pedagogy

- Lecture, Discussion, Quiz, Demonstrate, PPT, Case Studies

Course Designers

1. Mrs. K. Geethalakshmi
2. Mrs. M. Selvanayaki

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PDB2003	DATABASE MANAGEMENT SYSTEMS	Theory	71	4	-	4

Preamble

- This course provides an insight on the basics of database, database design, relational model and querying a database.
- It also gives an overview of NoSQL databases and storing and accessing data in a key/value database MongoDB.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define the fundamental elements of database management system	K1
CO2	Differentiate integrity constraints and various query statements	K2
CO5	Classify the different data functions and various join operations	K2
CO4	Demonstrate procedures, cursors, triggers and packages using PL/SQL programming	K3
CO5	Analyze the functioning of different types of NoSQL databases and relational databases	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M
CO2	S	M	S	S	M
CO3	M	S	S	M	S
CO4	S	M	M	S	M
CO5	M	S	S	M	S

S- Strong; M-Medium; L-Low.

DATABASE MANAGEMENT SYSTEMS - PDB2003

(71 Hrs)

Syllabus

Unit – I

14 Hrs

Database Concepts: Introduction -Relationships - DBMS -Relational data model - Integrity rules - Theoretical relational languages. Database Design: Data modeling -Dependency -Database design - Normal forms - Dependency diagrams – **Denormalization.**

Unit – II**14 Hrs**

Structured Query Language (SQL) : Introduction – DDL - Naming rules and conventions -Data types – Constraints - Creating table- Displaying table information - Altering an existing table– **Dropping, renaming, and truncating table** - Table type. Working with tables: DML - adding a new row/record – updating and deleting existing rows/records - Retrieving data from table - Sorting - CASE structure.

Unit – III**14 Hrs**

Functions and Grouping: **Built-in functions** - Grouping data. Joins and Views: Join -Join types. Views: Views - Creating a view - Removing a view - Altering a view. PL/SQL: Fundamentals -Block structure - comments - **Data types – Other data types - Variable declaration - Assignment operation**

Unit – IV**14 Hrs**

Control Structures and Embedded SQL: Control structures - Nested blocks - SQL in PL/SQL - **Data manipulation** - Transaction control statements. PL/SQL Cursors: Cursors -Implicit & explicit cursors and attributes - cursor FOR loops - Records - Tables - Procedures -**Functions** –Triggers

Unit – V**15 Hrs**

An overview of NoSQL - Characteristics of NoSQL – NoSQL storage types - Advantages and Drawbacks - MongoDB Introduction – **Creating database and Dropping database - Creating collection and Dropping collection – Insert, query and update document.**

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1. 1	Nilesh Shah	Database Systems Using Oracle	PHI	2 nd Edition, 2016
2.	Gaurav Vaish	Getting Started with NoSQL	Packt	2013

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Rajesh Narang	Database Management Systems	Prentice Hall of India,	2 nd Edition, 2011
2	Pramod Sadalge, Martin Fowler	NoSQL Distilled	Addison-Wesley	2012
3	Kristina Chodorow	MongoDB: Definitive Guide	Oreilly	2 nd Edition, 2015

Pedagogy

- Lecture, Demonstration

Note: Flipped mode learning topics are highlighted.

Course Activity

Unit	Topic	Activity	Web Resources
Unit I	Denormalization	Group Discussion	<ul style="list-style-type: none">• https://www.w3schools.com/sql• https://www.tutorialspoint.com/sql/• https://livesql.oracle.com• https://beginnersbook.com/2017/09/mon-godb-tutorial/
Unit II	Dropping, renaming, and truncating table	Case Study	
Unit III	Built-in functions- Data types – Other data types - Variable declaration- Assignment operation	Quiz	
Unit IV	Data manipulation, Functions	Seminar	
Unit V	Creating database and Dropping database - Creating collection and Dropping collection – Insert, query and update document.	Case Study	

Course Designers

1. Mrs.T.S.Anushya Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP20CP3	DBMS LAB	Practical	-	-	60	2

Preamble

- The lab course provides a way to explore storing and accessing data in database through query languages and PL/SQL programming language.
- It enables to experience a NoSQL key/value store database MongoDB.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand basic SQL query statements	K1
CO2	Gain knowledge on primary and foreign key constraints	K2
CO5	Apply functions and joins on data	K3
CO4	Demonstrate PL/SQL programming on databases	K3
CO5	Differentiate Key/value store database from relational database	K2

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	S	S
CO2	S	M	S	M	S
CO3	S	S	M	S	S
CO4	M	S	S	S	M
CO5	S	M	S	M	S

S- Strong; M-Medium; L-Low.

DBMS LAB - AP20CP3

(60 Hrs)

List of programs

1. Program using different data types and operators
2. Program using built-in functions and views
3. Program to update and alter table
4. Program to implement PL/SQL table and record
5. Program to implement splitting and joining the table
6. Program using Functions
7. Program using Cursors
8. Program using Triggers
9. Program to create and drop database in MongoDB

10. Program to create and drop collection in MongoDB
11. Program to insert, query and update document in MongoDB

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Mrs.M.Selvanayaki
2. Mrs.T.S.Anushya Devi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PR19SB01	DATA ANALYTICS - LEVEL I: R PROGRAMMING	Theory	43	2	-	4

Preamble

- This course covers the basics of R programming working environment.
- It also includes concepts involved in importing data, manipulating data for specific needs, running summary statistics and data visualizations through graphs, charts and plots.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Knowledge on R-Programming environment and libraries	K1
CO2	Understand the basics in R programming in terms of constructs, control statements and built-in functions	K2
CO5	Learn to apply R programming for matrix and vector processing	K2
CO4	Reading data from files and analyzing data using R	K3
CO5	Enables to visualize data using graphs and chart	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	M	M	S
CO2	S	S	S	S
CO3	S	M	S	S
CO4	S	S	S	S
CO5	S	S	S	S

S- Strong; M-Medium; L-Low

DATA ANALYTICS - LEVEL I: R PROGRAMMING- PR19SB01 (43Hrs)

Syllabus

UNIT I: (9 Hrs)

Overview of the R language: Defining the R project, Obtaining R, Generating R codes, Scripts, Comments, Text editors for R, Graphical User Interfaces (GUIs) for R, Packages.

UNIT II: (9Hrs)

R Objects and data structures: Variable classes, Vectors and matrices, Data frames and lists, Array and Factors.

UNIT III: (9 Hrs)

Manipulating objects in R: Mathematical operations, Decision making, loops, functions and Strings.

UNIT IV:**(8 Hrs)**

Exploratory Data Analysis: Reading, creating and storing R -CSV file, Excel File, Binary file, XML File - R -Mean, Median, Mode - Regression.

UNIT V:**(8 Hrs)**

Graphical Representation: R-PIE chart – Bar chart – Box plots - Histograms – line graphs - Scatter plots.

Text Book

Course materials will be provided.

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Jared P. Lander	R for everyone	Pearson Education, 2 nd Edition	2015
2	Norman Matloff	The Art of R Programming	No Starch Press	2011

Pedagogy

- Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

Course Designers

1. Mrs. S.Mohanapriya

NOTE:

* During Semester III UNIT I, UNIT II till Vectors and matrices.

** During Semester IV in UNIT II from Data frames, Unit III, Unit IV and Unit V.

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PD19SB01	OOSE – LEVEL I: SOFTWARE DESIGN TOOLS	Theory	43	2	-	4

Preamble

- This course facilitates to learn various concepts, tools and techniques that are used to design and implement software systems.
- This course gives a detailed description for developing software by identifying and implementing a set of objects and their interactions to meet the desired objectives.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Knowledge on basic Software engineering methods practices, and principles.	K2
CO2	Familiar with main components of different diagrams and the purpose of different modeling diagrams.	K2
CO3	Understand the basic concepts of software development life cycle and modeling techniques.	K3
CO4	Demonstrate data models, object models, context models and architectural models.	K3
CO5	Distinguish between component and deployment diagrams	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	M	M	M
CO2	S	S	S	M
CO3	S	S	S	S
CO4	S	S	S	S
CO5	S	S	S	S

T- Strong; M-Medium; L-Low

OOSE – LEVEL I: SOFTWARE DESIGN TOOLS - PD19SB01

(43Hrs)

Syllabus

UNIT I

(9 Hrs)

Introduction to UML: Overview of the UML- Importance of modeling- principles of modeling- object oriented modeling- conceptual model of the UML- Architecture- Software Development Life Cycle.

UNIT II

(9 Hrs)

Structural Modelling Basic Structural Modelling: Classes- Relationships- common Mechanisms- and diagrams. Advanced Structural Modelling: Advanced classes- advanced relationships- Interfaces- Types and Roles- Packages.

UNIT III

(9 Hrs)

Class & Object Diagrams: Terms and concepts- Construction of a class diagram- Common modelling techniques for Class & Object Diagrams-Interactions- Interaction diagrams.

UNIT IV

(8 Hrs)

Behavioural Modelling: Use cases- Use case Diagrams- Activity Diagrams. Advanced Behavioural Modelling- state machines- processes and Threads- Time and space- state chart diagrams.

UNIT V

(8 Hrs)

Architectural Modelling: Components- Modelling Techniques – Modelling a physical database- Model an adaptable system- Deployment - Component diagrams and Deployment diagrams.

Text Book: Course Materials will be provided

Reference Books:

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Martina Seidl, Marion Scholz, Christian Huemer, GertiKappel	UML @ Classroom: An Introduction to Object- Oriented Modeling	Springer	2015
2	Martina Seidl, Marion Scholz, Christian Huemer, GertiKappel	An Introduction to Object- Oriented Modeling	Easy Reader	2011

Pedagogy

- Lecture, Discussion, Quiz, Demonstrate, PPT, Case Studies

Course Designers

1. Mrs. A. Kavitha

NOTE:

* During Semester III UNIT I, UNIT II till Advanced Classes.

** During Semester IV in UNIT II from Advanced Relationships, Unit III, Unit IV and Unit V.

JOB ORIENTED COURSE

SEMESTER : III & IV

TITLE : PHP / MY SQL

SUB.CODE : JOB1625

OBJECTIVE:

- After completion of this course, students will be able to write and understand PHP programs, and use it to build dynamic web pages; and they can install and configure third-party PHP packages.

UNIT I:

Introduction to web application, History of HTML, Tags, Documents, Browsers, Structural Elements, Input Elements, Introduction to PHP, What is PHP, Advantages of PHP, PHP with HTML, Wamp server Installation and configuration, Basic syntax, Data types, Variables, constants, expressions, Operators, Control structures, Arrays & Functions, String manipulation.

UNIT II:

Embedding PHP in HTML, operators, conditional statements, looping structures, PHP arrays, processing array elements, Session management, register session variables, destroy session, store and retrieve cookies.

UNIT III:

PHP functions, PHP data and time, File Systems Security, Error Handling, Interfaces, Namespaces, file include & require, file uploading, sending E-mails.

UNIT IV:

Understanding an RDBMS, DDL, DML and DCL, Introduction to MySQL database, understanding tables, records & fields, primary & foreign keys, database constraints, normalization, Creating MySQL database/tables, working with database and tables, dropping and backup database, alter field properties,

UNIT V:

Insert records, edit & delete records, update records, filtering records, using operators, sort records, limiting results. Display specific record, display group of records and applying condition. Introduction to Jscript, loops, objects, events and common Jscript functions, validations.

REFERENCE BOOKS:

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre	Programming PHP	O'Reilly Media 3 rd Edition	2013
2	Robin Nixon	Learning PHP MYSQL and Java Script	O'Reilly Media 4 th Edition	2014

3	Paul Gibbs	Programming with PHP / MySQL	-	2015
4	Timothy Boronczyk, Elizabeth Naramore, Jason Gemer	Beginning PHP6, Apache, MySQL Web Development	Wrox	2013

PHP / MYSQL LAB Questions

HTML

- 1) Print the squares of the numbers 1 - 10. Each number should be on a separate line, next to it the number 2 superscripted, an equal sign and the result. (Example: $10^2 = 100$)
- 2) Print two lists with any information you want. One list should be an ordered list, the other list should be an unordered list. Min 5 items
- 3) Display an image that when clicked will link to itself and will display the image in the browser by itself.

JAVASCRIPT

- 1) Write a JavaScript function that accepts a number as a parameter and check the number is prime or not.
- 2) Write a JavaScript function to compute the value of b^n where n is the exponent and b is the bases. Accept b and n from the user and display the result.
- 3) Write a JavaScript program to compute the sum and product of an array of integers.
- 4) We have the following arrays:

Color = ["Blue ", "Green", "Red", "Orange", "Violet", "Indigo", "Yellow "];

o = ["th", "st", "nd", "rd"];

Write a JavaScript program to display the colors in the following way:

"1st choice is Blue." "2nd choice is Green." "3rd choice is Red."

PHP

1. How to Install WAMP server and MySQL server.
2. How to create a function to perform addition of two numbers in PHP.
3. How to create a function to perform addition of two numbers in PHP.
4. Write a program to redirect a browser request to another web page
5. Write a program to display different image each time out of four images
6. Write a SQL statement to create a table **PURCHASE_ORDER** including columns

FIELD NAME	DATA TYPE	SIZE	DESCRIPTION
Pur_ord_id	Integer	5	Purchase order id
Pur_date	Date/Time		Purchase Date
Prod_name	Varchar	20	Product Name
Qty	Integer	3	Quantity
Price	Float		Price
Total	Float		Total amount

Make sure that the column purchase order id will be unique and store an auto incremented value.

Insert few records of your own from SQL Query.

Display values in purchase_order table.

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP20C07	DIGITAL ELECTRONICS & MICRO PROCESSOR	Theory	71	4	-	4

Preamble

- To provide introduction to the principles and practices of digital electronics and Computer system, programming aspects of microprocessor covering both hardware and software based on the 8085 microprocessor family.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic principles of digital electronics and microprocessors.	K1
CO2	Discussion on the design of Multiplexers and Flip-Flops	K2
CO3	Outline the Microprocessor instruction set and Architecture	K2
CO4	Identify and explain the need for advance micro processors	K3
CO5	Develop to take up the challenges in building useful microprocessor based applications.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	S	S	M
CO2	M	M	S	M
CO3	M	S	S	S
CO4	S	S	S	M
CO5	M	M	S	S

S- Strong; M-Medium; L-Low

DIGITAL ELECTRONICS & MICRO PROCESSOR - AP20C07 (71 hours)

Syllabus

UNIT I: (15 Hrs)

Logic Circuits: Gates –AND ,OR,NOT,NAND ,NOR Gates & Truth tables-Boolean Algebra-Karnaugh maps, Product of Sums method, Sum of product method, Don't Care condition –Multiplexers, Demultiplexers-Flip flops: RS ,JK ,D,T-Decoders.

UNIT II: (14 Hrs)

Shift Register, Half adder, Full adder, BCD Adder, Semiconductor memories: ROM, RAM, Digital Recording Techniques.

UNIT III: (14 Hrs)

Microprocessor: Microprocessor Instruction set and Computer languages –from large computer to single-chip micro controllers-microprocessor architecture & its operations –memory-Input output (I/O) devices.

UNIT IV:**(14 Hrs)**

The 8085 Programming model: Instruction classification-instruction format-how to write, assemble and execute a simple program-overview of the 8085 instruction set-programming techniques: Looping, counting and indexing-additional data transfer and 16 bit arithmetic instructions.

UNIT V:**(14 Hrs)**

The 8259A programmable interrupt controller – Direct memory Access (DMA) and the 8237 DMA controller. Microprocessor Applications-Designing scanned displays-Memory Design.

Text Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Morris Mano	Digital logic & computer design (UNIT I&II)	Prentice hall India, 1 st Edition	2008
2	Ramesh Gaonkar	Microprocessor Architecture Programming and applications with the 8085 (UNIT III,IV,V)	Penram International publishing, 5 th Edition	2011

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Mohamed Rafiquzzaman	Microprocessor & Microcomputer-based system design	UBS Publishers distributors Pvt .Ltd, 1 st Edition	2003
2	S.Salivahanan, S.Arivazhagan	Digital Circuits and Design	Vikas Publishing house Pvt Ltd., 3 rd Edition	2009

Pedagogy

- Chalk and Talk, PPT, Demo, Discussion, Quiz, and Assignment.

Course Designers

1. Mrs.T.Saranya
2. Mrs.A.Kavitha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP20C08	COMPUTER NETWORKS	Theory	71	4	-	4

Preamble

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network
- To understand the various components required to build different networks.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer.

Course Outcomes

On Completion of the course, the students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic layers and its functions in computer networks.	K1
CO2	Evaluate the performance of a network.	K2
CO3	Understand the basics of how data flows from one node to another.	K2
CO4	Analyze and design routing algorithms	K3
CO5	Design protocols for various functions in the network	K3
CO6	Understand the working of various application layer protocols.	K2

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	M	M	S	M	M
CO3	M	S	S	S	M
CO4	S	S	S	M	S
C05	M	S	S	S	M
C06	M	S	S	S	S

S- Strong; M-Medium; L-Low

COMPUTER NETWORKS - AP20C08

(71 hours)

Syllabus

UNIT I:

(15 Hours)

INTRODUCTION AND PHYSICAL LAYER: Networks-Networks Types-Protocol Layering-TCP/IP Protocol suite-OSI Model -Physical layer: Performance-Transmission Modes-Switching-Introduction-Circuit Switching-Packet Switching-Structure of a Switching.

UNIT II: (14 Hours)

DATA -LINK LAYER& MEDIA ACCESS: Introduction-LINK Layer Addressing -DLC Services-Data Link Layer Protocols-HDLC-PPP-Media Access Control-Wired LANS: Ethernet-Wireless LANS-Introduction-IEEE 802.11, Bluetooth-Connecting Devices.

UNIT III: (14 Hours)

NETWORK LAYERS: Network Layer Services-Packet Switching- Network Layer Performance-IPV4 Addresses-Forwarding of IP Packets-Network Layer Protocols: Internet Protocol, ICMP V4- Unicast Routing Algorithms- Protocols-Multicasting Basics- IPV6 Addressing-IPV6 Protocol.

UNIT IV: (14 Hours)

TRANSPORT LAYER: Introduction-Transport Layer Protocols -Services -Port Numbers -User Datagram Protocol- Transmission Control Protocol-SCTP.

UNIT V: (14 Hours)

APPLICATION LAYER: World Wide Web and HTTP- FTP- Electronic mail- Telnet -SSH - DNS- Network Management- SNMP.

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Behrouz A.Forouzan,	Data Communications and Networks	Tata McGraw-Hill Publishing , 5 th Edition	2013

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Larry L. Peterson, Bruce S. Davie	Computer Networks: A Systems Approach	Morgan Kaufmann Publishers Inc., 5 th Edition	2012
2	William Stallings	Data and Computer Communications	Pearson Education, 10 th Edition	2013
3	Nader F. Mir	Computer and Communication Networks	Prentice Hall,2 nd Edition	2014
4	James F. Kurose, Keith W. Ross	Computer Networking, A Top-Down Approach Featuring the Internet	Pearson Education,6 th Edition	2013

Pedagogy

- PPT, Black board, Discussion, Self-questioning by students, Group discussion, Quiz

Course Designers

1. Mrs. T. S. Anushya Devi
2. Mrs. L.Sheeba

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP20C09	JAVA PROGRAMMING	Theory	71	4	-	4

Preamble

- To impart the fundamental programming concepts of core java and gain exposure about inheritance, packages & collection interfaces.
- To analyse and implement exception handling & multithreading concepts in java.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recognize design of java class & solve basic design problems using object oriented concepts	K1
CO2	Execute inheritance codes.	K2
CO3	Write java application programs using packages & collection interfaces.	K2
CO4	Implement the robust & multitasking application using exception handling concepts.	K3
CO5	Design using Applet Codes	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	M	M	S
CO3	S	S	M	S
CO4	S	S	S	S
CO5	S	M	S	M

S- Strong; M-Medium; L-Low

JAVA PROGRAMMING – AP20C09

(71 hours)

Syllabus

UNIT I:

(14 Hrs)

JAVA Basics: Object Oriented Programming (OOP) Concepts, Features of Java language, Types of Java programs, Java Architecture- literals, integer, floating point, character, string and Boolean literals. Data types, integer, floating point, character and Boolean -variables-structure of a Java program-comments, expression, statement, type conversion, block statement, scope. Operators - Arithmetic, Bitwise, Relational, Boolean logical and ternary operators, Operator precedence. Control statements - if...Else, Switch, While, do...while, for, break and continue statements, comma statement.

UNIT II:

(14 Hrs)

Arrays: One dimensional array, multi-dimensional array, Arrays class.
Classes and Objects: Defining a class, new operator and object, the dot (.) operator- method declaration and calling, constructors, instance variable hiding, method overloading, passing objects and arrays as parameter to methods.

UNIT III:**(14 Hrs)**

Inheritance: Creating sub-classes, method overriding, final class, final methods and final variables, object destruction and garbage collection, recursion, Static method, block and variables-abstract classes.

Packages and Interfaces: Defining a packages, the import statement, access modifier, defining an interface, implementing an interface.

UNIT IV:**(15 Hrs)**

Exception Handling: Types of Exceptions, Catching Exceptions, Rethrowing Exceptions, creating your own exceptions, throws exception, finally block, checked and unchecked exceptions.

Handling I/O Files: I/O Streams, File Class and Byte Stream – Disk File Handling, FileInputStream and FileOutputStream classes- Filtered Streams, DataInputStream and DataOutputStream. Strings - The String Class, String Buffer class, String Builder class.

UNIT V:**(14 Hrs)**

Multithreaded Programming: Multitasking, Creating a Thread, States of a thread, multithreaded programming, thread priorities, thread- join () method, controlling the threads.

Applets: Applet basics, Applet life cycle methods, some methods in Applet, displaying text in status bar, embedding applet information, the HTML applet tag, reading parameters into applet.

Graphics- Drawing Lines, rectangles, ovals, arcs, polygon and polyline.

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	K. Somasundaram	Introduction to Java Programming	Jaico Pub.House, Mumbai	2013

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	E. Balagurusamy	Programming With Java - A Primer	TMH, 5 th Edition	2015
2	Patrick Naughton & Hebert Schildt	The complete reference java 2	TMH 5 th Edition	2011
3	John R.Hubbard	Programming with java	TMH, 2 nd Edition	-
4	Scheldt H	Complete reference Java2	TMH	
5	Weber J. L	Using Java2	TMH	

Pedagogy

- Lecture, Discussion, Quiz, Demonstrate, PPT, Case Studies

Course Designers

1. Mrs. M. Selvanayaki
2. Mrs. S. Kavitha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP20CP4	JAVA & BIOPERL PROGRAMMING LAB	Practical	-	-	60	3

Preamble

- To know how to solve basic design problems using object oriented concepts.
- To provide the hands on experience on Java Programming and improve the practical skill set.
- The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction JAVA code.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify the logic for the given problem, recognize and understand the syntax and construction JAVA code.	K1
CO2	Understand and design the classes using string functions & methods.	K2
CO3	Develop java application programs using packages & collection interfaces.	K3
CO4	Implementing the concepts of Bio sequence to store and read the data.	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	S	M	S
CO2	S	S	M	S
CO3	S	S	S	S
CO4	S	M	M	M

S- Strong; M-Medium; L-Low

JAVA & BIOPERL PROGRAMMING LAB – AP20CP4

(60 hours)

List of Programs

- Program with class and creating an object
- Program with String Functions
- Program with two or more constructors
- Program to create an interface and implement in a class
- Program to create two threads
- Applet reading data from the Applet tag.
- Program to draw various shapes
- Opening a File and searching the given specific term
- Program for Appending two DNA Sequences
- Program to concatenating DNA Fragments Transcription :DNA to RNA
- Program using Hashes to combine sequences

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Mrs. M. Selvanayaki
2. Mrs. S. Kavitha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PD20A01	DIGITAL MARKETING	Theory	86	4	-	5

Preamble

- This course provides an overall understanding of the various digital marketing platforms and tools available for creating an effective digital marketing strategy.
- It provides technical skills to design and develop an integrated digital marketing plan for an organization.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the role of digital marketing in marketing strategy	K2
CO2	Identify the key elements of a digital marketing strategy	K1
CO5	Analyze the role that social marketing plays in the digital marketing	K3
CO4	Demonstrate common digital marketing tools such as SEO and Social media	K3
CO5	Apply conceptual frame works of digital marketing	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	M
CO3	S	S	S	M	M
CO4	S	S	S	M	S
CO5	S	S	M	S	M

S- Strong; M-Medium; L-Low.

Digital Marketing - PD20A01

(86 Hrs)

Syllabus

Unit – I

17 Hrs

Introduction to Digital Marketing: Introduction - Original and Development of Digital Marketing - Internet Users: Penetration and Kind of Internet Use - Digital Marketing strategy – Digital Advertising Marketing Plan - Ethical and legal of framework of Digital Marketing - Skills Required in

Digital Marketing - Digital Advertising: Introduction - Concept of display advertising - Digital Metrics
 - Types of Digital Ad - Targeting in digital marketing - Challenges faced by display marketing.

Unit – II

17 Hrs

Search Engine Advertising: Introduction – Why pay for search advertising? – Understanding Ad Placement – Understanding Ad Ranks – Why is the Ad rank important? – Create your first Ad Campaign – Google Ads Account – Best practices for creating effective Ads - Enhance your Ad Campaign – Performance Reports – E-Commerce Social Media Marketing: Introduction - Strategy - Implementation - Measure - Improve - Social Entertainment - Different forms of social entertainment – Gamification.

Unit – III

17 Hrs

Face book Marketing : Introduction – Organic Marketing – Paid Marketing – Facebook Insights LinkedIn: Introduction - LinkedIn Strategy - Content Strategy - LinkedIn Native Videos - LinkedIn Analytics - Asset Copying - LinkedIn Sales Navigator - Adcampaign - Emerging Platforms: Instagram – Pinterest.

Unit – IV

18 Hrs

Search Engine Optimization: Introduction – Search Engine – The Concept of SEO – SEO Phases – Website Audit – Content – On-Page Optimization – Off-Page Optimization – Social Media Reach – Maintenance – Local Search SEO – SEO Visual Search – Voice Change will change the SEO Industry – Sub domains vs Subfolders – SEO – UX and UI – Website Navigation - Social Media Icons – External Links – Pop-ups – Advanced Website Features.

Unit – V

17 Hrs

Mobile Marketing: Introduction – Mobile Advertising – Mobile Marketing Toolkit – Mobile Marketing Features – Mobile Analytics – Mobile APPS. Digital Analytics: Introduction – Data Collection – Key Metrics – Outcome Analysis – Experience Analysis – Making Web Analytics Actionable – Creating High- Impact Executive Dashboards – Types of Tracking Code – Competitive Intelligence.

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Seema Gupta	Digital Marketing	McGraw Hill Education	2 nd Edition, 2018

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Simon Kingsnorth	Digital Marketing Strategy: An Integrated Approach to Online Marketing 2nd Edition	Kogan Page	2 nd Edition, 2019
2	Dave Chaffey	Digital Marketing	Pearson	7 th Edition, 2019

3	Stephanie Diamond	Digital Marketing All-in-One For Dummies	For Dummies	1 st Edition, 2019
4	Kevin Hartman	Digital Marketing Analytics: In Theory And In Practice	Ostmen Bennett Bridge Publishing Services	2 nd Edition, 2020

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Course Designer

1. Mrs. K . Geethalakshmi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PM20A02	M-COMMERCE	Theory	86	4	-	5

Preamble

- This course provides an insight on M-Commerce principles and business models.
- It also explores the concept of mobile commerce technologies, applications, mobile payment methods, security, and ethics.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental concept of E- commerce and process of business models	K1
CO2	Knowledge on M- Commerce applications and architecture	K1
CO5	Differentiate the payment methods in M- payment and security	K2
CO4	Analyze the infrastructure, fraud prevention and payment methodologies	K3
CO5	Examine the legal and ethical issues in mobile commerce	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	M	S
CO5	S	S	M	S	M

S- Strong; M-Medium; L-Low.

M-Commerce - PM20A02

(86 Hrs)

Syllabus

Unit – I

17 Hrs

Introduction to E- Commerce: Introduction – E-commerce –E-business – Categories of E- commerce applications – Global trading environment – Adoption of E- commerce – Traditional and Electronic commerce – Advantages and disadvantages of E- commerce. Business Models of E-commerce: Introduction – Business models of E-commerce- Business to Consumer (B2C) – Business to Business (B2B) –Difference between B2C and B2B – C2C: Definition –Characteristics and Applications of C2C EC – Consumer to Business (C2B) – Business to Government (B2G).

Unit – II**17 Hrs**

Mobile Commerce and WAP: Introduction to Mobile Commerce – Application – Advantages of M-commerce – Wireless Application Protocol – WAP Browser – Features of WAP 2.0 – Technologies of M-commerce – Overview of WML – Architectures of Mobile Commerce.

Unit – III**17 Hrs**

Mobile commerce Risk, Security and Payment Methods: Introduction – Security and Payment Methods – Mobile Commerce Security – Security Mechanism – Mobile Security – Network Infrastructure and Security- WLAN and Security – WAP and Security - Mobile commerce payment methods – Mobile payment operations – Mobile payment standardization – Reputation and trust – Application and Risk scenarios – Reputation systems – Trust model.

Unit – IV**18 Hrs**

Mobile Money Infrastructure and Fraud Prevention for M- Payment: Introduction – Requirement for authentication infrastructure for M-commerce – Trust relationship – Requirement for Mobile Commerce – Password based authentication for mobile users with support for public key technology – M – payment value chain – Life cycle - Operational Issues in M- Commerce payment – Mobile payment systems – General analysis of the payment solutions – Fraud management systems in M-Commerce – Mobile payment and money transfers – Mobile payment landscapes.

Unit – V**17 Hrs**

Legal and Ethical Issues : Introduction – Issues related to E- commerce – Legal issues – Taxation and E- commerce – Cyber Laws : Introduction – Cyber laws in India – Salient Provisions of Cyber Law – Contracting and contract Enforcement - IT act 2000 – Jurisprudence of Indian cyber law – Salient features of the Information Technology act 2008.

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Dr. U.S. Pandey and Er. Saurabh Shukla	E- Commerce and Mobile Commerce Technologies	S.Chand & Company Pvt. Ltd	2 nd Revised Edition, 2014

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Karabi Bandyopadhyay	Mobile Commerce	Prentice Hall India Learning Private Limited	2013
2	Paul May	Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business	Cambridge University Press;	1 st Edition, 2001

3	Norman Sadeh	M-Commerce: N-Technologies, Services, and Business Models	John Wiley & Sons,	2003
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Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Course Designer

1. Mrs. S Mohana Priya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PR19SBP1	DATA ANALYTICS – PRACTICAL I: R PROGRAMMING	Practical		-	45	2

Preamble

- This course is used to understand the concepts used to perform vector operations and matrix operations. It familiarizes the students with various statistics operations mean, median etc., are performed.
- It enables the student to explore data from a variety of sources by building regression model and to generate charts, graphs, and other data representations.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental syntax of R through demonstrations, and writing R code	K2
CO2	Apply concepts such as data types, iteration, control structures, functions, and boolean operators using R	K2
CO3	Able to import a variety of data formats into R using R Studio	K3
CO4	Explore data-sets to perform appropriate statistical tests using R	K3
CO5	Acquire skills to generate charts and graphs visualization using R	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	M	M	M
CO2	S	M	S	M
CO3	S	S	S	S
CO4	S	S	M	S
CO5	S	S	S	S

S- Strong; M-Medium; L-Low

Data Analytics - Practical I: R Programming – PR19SBP1

(45Hrs)

List of Programs

- R Program for Vector operations.
- Create an R- list.
- Implement matrices addition, subtraction and Multiplication.
- Create a Data frame.
- Create a factor object.
- Import data, copy data from CSV file to R.
- Create an R program for Mean median and mode.
- Draw Bar charts and Pie charts in R.

9. Make visual representations of data for plotting functions in R.
10. Create an R program for Regression Model.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Mrs.S. MohanaPriya

NOTE:

*During Semester III Program 1 to program 6

**During Semester IV Program 7 to program 10

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PD19SBP1	OOSE – PRACTICAL I: SOFTWARE DESIGN TOOLS	Practical	-	-	45	2

Preamble

- The objective of this course is to enable the student to practice the object-oriented analysis and design through UML diagrams for real time software applications.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Design ERD and DFD for real time problem	K2
CO2	Draw use-case and activity diagram for the given application	K2
CO3	Construct state chart and sequence diagram for use-cases	K3
CO4	Build collaboration and class diagram for modules	K3
CO5	Gain knowledge to build UML diagrams for real world problems	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	S
CO3	M	S	S	S
CO4	S	M	S	S
CO5	S	S	S	M

S- Strong; M-Medium; L-Low

OOSE - Practical I: Software Design Tools – PD19SBP1

(45Hrs)

List of Programs

Choose any one of the projects given below and do the exercises program for the project.

[Student Marks Management System, Library Management System, Employee Management System, Hostel Management System]

- Write the complete problem statement
- Write the software requirement specification document
- Draw the entity relationship diagram

4. Draw the data flow diagrams at level 0 and level 1
5. Draw use case diagram
6. Draw activity diagram of all use cases.
7. Draw state chart diagram of all use cases
8. Draw sequence diagram of all use cases
9. Draw collaboration diagram of all use cases
10. Assign objects in sequence diagram to classes and make class diagram.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designers

1. Mrs. A. Kavitha

NOTE:

* During Semester III, Program 1-6

** During Semester IV, Program 7-10