ST.TERESA'S COLLEGE (AUTONOMOUS)
ERNAKULAM

(Affiliated to Mahatma Gandhi University, Kottayam)

CURRICULUM AND SYLLABI FOR
BACHELOR'S PROGRAMME IN
COMPUTER APPLICATIONS
(TRIPLE MAIN)

Under Choice Based Credit & Semester System

(2018 Admissions)

St. Teresa's College, (Autonomous)
Department of Computer Applications
Board of Studies in Computer Applications

Sl No.	Name of the member	Official Address	Designation
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2.	Dr. B Kannan	Head Of the Department, Department of Computer Applications, Cochin University of Science and Technology,Cochin -22	Subject Expert (Computer)
3.	Dr.Mary George	Assistant Professor, Department of Mathematics St.Aloysious College, Edathua	Subject Expert (Mathematics)
4.	Dr.Angel Mathew	Associate Professor, Department of Statistics Maharajas College, Ernakulam	Subject Expert (Statistics)
5.	Mr.K R Remesh Babu	Assistant Professor Department of Information Technology Government Engineering College, Idukki	Subject Expert (Computer-Cloud Technology)
6.	Mr.Saj Janin J	Principal Architect Cognizant Technology Solution, Kochi	Expert from the Industry
7.	Mrs. Sebby K X	Sr. HSST,EMGHS, FortKochi	Alumnus
8.	Mrs.Sheeba Emmanuel	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
9.	Mrs.Dhanya R	HOD,Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
10.	Ms.Sangeetha Chandran	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member

Sl No.	Name of the member	Official Address	Designation
11.	Mrs.Nunuz Joseph	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
12.	Mrs.Raji S Pillai	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
13.	Mrs Laya Joseph M	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
14.	Mrs Alia Teresa TM	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
15.	Mrs.Kalpana C	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
16.	Mrs.Mekha Jose	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
17.	Mrs Archana Menon P	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
18.	Ms.Mahima Mary Mathews	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
19.	Ms.Christina Rajan Thomas	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member
20.	Mrs.Annie Merlyn Rodrigues	Assistant Professor ,Department of Computer Applications, St.Teresa's College, Ernakulam	Member

FOREWORD

Autonomy in the field of higher education implies responsibility and accountability and this in turn leads to excellence in academics and pro active governance. St Teresa's College was given autonomous status in the year 2014 and we have made a concerted attempt to maintain a high level of quality in the standard of education that we impart.

Academic autonomy has granted us the freedom to fine tune the syllabus keeping in mind the changing needs of the new generation of students. Education in the current scenario throws up a multitude of challenges and the curricula and syllabi ought to reflect the paradigm shift that has occurred in the various disciplines. Structured feedback was taken from the Students, Alumni and the experts from the industry and the changes suggested by them were duly incorporated in the syllabi.

The Board of Studies constituted for each department meet regularly in the stipulated time frame and in depth discussions are conducted about the different dimensions of the curricula and syllabi. The IQAC team has felicitated the conduct of a number of workshops and conferences to equip the faculty with the necessary skill set to frame the syllabi, set question papers for internal tests that evaluate whether the learning outcomes enlisted in the syllabus have been achieved and to ensure the fair and transparent conduct of examinations.

The responsibility that autonomy has placed on us is indeed onerous but we have strived together to meet all the challenges that were placed in our way. We have worked towards moulding young women as responsible citizens who will carry forward the task of nation building in an exemplary manner. All effort has been made to nurture their academic ambitions as well as their skills in co curricular activities.

With sincere gratitude I acknowledge the instinct support and constant guidance extended by Rev. Sr. Dr. Vinitha, the Director of the College.

I specially thank the team headed by Smt. Shanty B. P. for updating the *syllabi*, the Heads of the Departments and all the faculty members for their diligence, commitment and exceptional contribution towards this endeavour.

DR. SAJIMOL AUGUSTINE. M
PRINCIPAL

PREFACE

As an autonomous college under Mahatma Gandhi University, St. Teresa's College has taken conscientious efforts to strengthen the curriculum by retaining all the fundamental stipulations of the University/Higher Education Council, to ensure a well-balanced Curriculum. Within the constraints of a prescribed syllabus, we have resolved to take a collective effort to create an inspiring academic culture in the institution, essential for teachers and students to access deeper knowledge and participate in its expansion and transmission. It is also to re-articulate the almost lost or forgotten fact that production and transmission of Quality Knowledge, essential for the development of students in particular and society in general, are the primary functions of any Educational Institution.

The Syllabus restructuring of 2018 aims to provide the students many opportunities to engage with authentic, real world learning. This has been evident through the significant number of new Programmes introduced at the wake of autonomy in 2014 with their integral placement opportunities. Increasingly, however, opportunities for engagement in work-based learning that can be provided through the curriculum across a range of subject areas are creating new and exciting ways to support student learning.

I acknowledge the efforts taken by the teachers in developing Programme and Course outcomes that focus on cognitive and intellectual skills of the learners ,confidence to carry out independent and scholarly research in area of professional interest to them and to position themselves globally effective cross- cultural educators .

I congratulate the efforts taken by the Principal Dr. Sajimol Augustine M. and the team for restructuring the syllabi under the leadership of Smt. Shanty B.P in a meaningful manner. Transformation is what makes St. Teresa's distinctive. Transforming lives in order to make a real impact on the local and international stage through the creation, sharing and application of knowledge. We look forward to sharing with you the outcomes of our curriculum restructuring and these resources we hope will enable you to reflect on learning gain in our own institution.

DR. SR. VINITHA (CELINE E)
DIRECTOR.

ACKNOWLEDGMENT

The syllabus restructuring of the Bachelor in Computer Applications[Triple Main] programme would not have been possible without the guidance and the help of several individuals who in one way or other contributed and extended their valuable assistance in the preparation and completion of this work.

The Board of Studies in Department of Computer Applications takes this opportunity to express our deep appreciation to all academicians and professionals who participate in the workshops organized by St. Teresa's College (Autonomous) for restructuring the UG Course in Department of Computer Applications. I remember with gratitude the support of our Director, Rev. (Dr). Sr. Vinitha, Principal, Dr. Sajimol Augustine. M, Prof. Jogy Alex, Dept. of Chemistry, St. Thomas College, Pala and the members of syllabus revision committee during the syllabus restructuring process.

I am grateful to the Board of Studies members of the Department of Computer Applications for their valuable insights and guidance throughout the process.

I am indebted to the faculties of Department of Computer Applications for their kind co-operation in all phases of this syllabus restructuring process.

We place on record our gratitude to the Syllabus Restructuring committee headed by Smt. Shanty B P, Assistant Professor of Department of Statistics, for the timely and valuable guidance. We express our whole- hearted gratitude to all those who have helped us in this endeavor.

Dr.Sabu M K
Chairman, Board of Studies
Department of Computer Applications

Contents

B.Sc. Programme In Computer Applications [Triple Main]
under choice based credit and semester system
(2018 admission onwards)

PREAMBLE

Bachelor in Computer Applications (Triple Main) programme at Department of Computer Applications, St.Teresa's College was following the syllabus of Mahatma Gandhi University, Kottayam from the academic year 1995-1996.And a restructured syllabus 2015 Admission onwards. After it was granted academic autonomy in the year 2014, and hence has the privilege of restructuring the syllabus. Keeping an eye on the industry and to modernize the curriculum, the Board of Studies members of the Department of Computer Applications, St.Teresas College, has initiated a restructuring of the syllabus for Bachelor in Computer Applications (Triple Main) programme for 2018 Admissions.

The syllabus aims to focus on enabling the students to familiarize with the new technologies, and at the same time enhance and strengthen the fundamental knowledge in Computer Applications, Mathematics, and Statistics.

GRADUATE ATTRIBUTES

The Bachelor in Computer Applications (Triple Main) programme will equip the students with the necessary knowledge and skills for the existing and emerging challenges that a career in computing and software technology will entail. In addition it prepares graduates to show high quality of independent thought, flexibility and maturity based on a sound technical knowledge of the field.

The Bachelor in Computer Applications (Triple Main) programme, will act as a feeder course for higher studies in the area of Computer Applications, Mathematics and Statistics.

The Bachelor in Computer Applications (Triple Main) programme aims to provide graduates with the skills and methods needed to create new generations of software applications and to appreciate the technical basis on which they should be built. The emphasis throughout is on a thorough understanding of the foundations on which modern development rests, on the software life cycle and project control, on program specification and implementation, on modern software architectures and on human-computer interaction issues through Mathematical and Statistical concepts.

The Bachelor in Computer Applications (Triple Main) is a three year programme which consists of six semesters of six months duration.

After the successful completion of first year, the students will,develop problem-solving strategies, techniques and skills that can be applied to computers and problems in other areas which give students an introduction to computer and analytical skills to use in their subsequent course work and professional development.

- Develop proficiency in C programming language.
- Develop fundamental ideas of Mathematical Logic. Develop data reduction techniques.
- Understand probability theory and random variables.
- After the successful completion of second year, the students will,
- Be familiar with major algorithms and data structures such as balanced search trees, hash tables, priority queues etc.
- Be familiar with the role of project management including planning, scheduling, risk management, etc.
- Understand the approaches to verification and validation including static analysis, and reviews.
- Be proficient in PHP and MY SQL
- Be able to define and interpret parametric equations & Polar coordinates of Conic Sections.
- Be able to find the higher order derivative of the product of two functions.
- Be able to expand a function using Taylor's and Maclaurin's series.
- Be able to interpret equations of lines and planes in space
- Expose the real-life applications of Probability distributions.
- Explain standard error and testing procedures for parameters of a Normal population using large and small samples
- After the successful completion of third year, the students will,
- Be proficient in Object Oriented Programming and JAVA IDE.
- Be able to develop and manage a Website.
- Be familiar with different operating systems.
- Be able to develop quality software solution by following the software engineering principles and practices.
- Recognize the meaning and significance of the emergence of fuzzy set theory.
- Understand and can solve problems related to real numbers.
- Understand simple random sampling
- Illustrate ANOVA of one way and two way classified data
- Explain the layout and analysis of basic designs
- Use a range of programming languages and tools to develop computer programs and systems that are effective solutions to problems.

- Be able to understand, design, and analyze precise specifications of algorithms, procedures, and interaction behavior.
- Be able to apply mathematics, logic, and statistics to the design, development, and analysis of software systems.
- Be equipped with a range of fundamental principles of Computer Science that will provide the basis for future learning and enable them to adapt to the constant rapid development of the field.
- Have experience of working in teams to build software systems.

AIMS AND OBJECTIVES

Overall Course Objectives

- To understand fundamentals concepts of computational thinking as well as knowledge of how computers and other digital devices are operated through interface as operating system.
- To be able to think logic of any real problem and able to implement it with programming concept. Student will able to integrate concepts of database, commerce, mathematics and statistics to store, summarize, analyze and interpret data for any real application.
- To get an appropriate level of oral, written and visual communication skills required for technocrats.
- To gain a thorough understanding or grasp key technologies for software application development.
- To apply knowledge and skills to develop software as a "model" or develop an application in the "software as a model" perspective.
- To understand efficient Query generation and acquire query optimization skills.
- To understand the concepts of Computer interconnectivity, sharing of resources, internet technologies and other network applications.
- To understand the electronic commerce and how electronic commerce is affecting business enterprises, governments, consumers and people in general.

PROGRAMME DESIGN

The U.G. Programme in Computer Applications [Triple Main] must include (a) Common courses, (b) Core courses, (c) Complementary Courses, (d) Choice based courses (e) Open courses and (f) Project work and Course viva - voce. No course shall carry more than 4 credits. The student shall select any one open course in Semester V offered by any department other than their parent department including the physical education department, depending on the availability of infrastructure facilities, in the institution.

The B.Sc. programme in Computer Application includes,

Common courses

Core courses

a. Choice Based Core Course
b. Project
c. Open Course

Common courses- The common course shall be provided for first two semesters. With four credits each.

Core courses - The programme offers core courses from three main streams, Computer, Mathematics and Statistics .Credits are distributed in the ratio 3:2:2

Choice Based Core Course

A Choice Based Core Course is provided in the sixth semester. The student has to select a course from a provided list. Departments have the freedom to change current papers /choose other papers if found relevant. But changes should not affect number of teaching hours of each department

Project

- All students have to do a project in the **Final** year.
- This project can be done individually or as a group of 3 students. The projects are to be identified during the 5^{th} semester of the programme with the help of the supervising teacher. The project evaluation will be carry out in the sixth semester.

Open course

All students are expected to do the open course in fifth semester. The students can opt from the courses offered by any discipline other than their own core discipline

PROGRAMME STRUCTURE

MODEL III B.Sc. COMPUTER APPLICATIONS [TRIPLE MAIN]

A.	Programme Duration	6 Semesters
B.	Total Credits required for successful completion of the Programme	120
C.	Credits required from Common Course I	8
D.	Credits required from Core course including Project	109
E.	Credits required from Open Course	3
F.	Minimum attendance required	75%

COURSES

The programme (Model III) consists of common courses with 8 credits, core course, Choice based course with 109 credits and open course with 3 credits.

SCHEMES OF COURSES

The different types of courses and its number is as follows:

Model- I	
Courses	**Number**
Common Courses	2
Core Courses (Theory)	25
Project & Course Viva	2
Core practical	5
Open Course	1
Choice based Course	1
Total	36

COURSES WITH CREDITS

For MODEL 3 is given below

Courses	**Credits**
Core Courses	101
Open Course	3
Choice Based Core	4
Project, I.V. & Viva	4
Total	112
Common Courses	8
Total	8
Grand Total	**120**

COURSE CODE FORMAT

The programme is coded according to the following criteria.

1. The first letter plus second letter from the programme ie., **CA**
2. One digit to indicate the semester. i.e., **CA1 (Computer, 1st semester)**
3. One letter from the type of courses such as, **A** for common course, **B** for core course, **C** for Complementary course, **D** for Open course, ie.., **CA1B (Computer, 1st semester Core course)** and **PR** for project.
4. Two digits to indicate the course number of that semester. ie.., **CA1B01 (Computer, 1st semester, Core course, course number is 01)**
5. The letter **B** to indicate Bachelors Programme.
6. **CA1B01B** (Computer, 1st semester, Core course, courses number 01, and **B** for bachelors Programme)
7. **18 to indicate the year.** ie.., **CA1B01B18**
   The letter **P** denotes practical – it should come after the code letter for the course ie…,**BP** (core practical-eg. CA2BP01B18
8. Main Project: CA6BPRB18

SCHEME OF DISTRIBUTION OF INSTRUCTIONAL HOURS FOR CORE COURSES

Semester	Model III	
	Theory	**Practical**
First	16	4
Second	16	4
Third	22	3
Fourth	21	4
Fifth	23	2
Sixth	20	5

DURATION OF PROGRAMME

- The duration of U.G. Programmes shall be **6 semesters**.
- A student may be permitted to complete the programme, on valid reasons, within a period of 12 continuous semesters from the date of commencement of the first semester of the programme.
- Attendance: Students having a minimum of 75% average attendance for all the courses only, can register for the examination.

STRUCTURE OF THE PROGRAMME
Bachelor's Programme in Computer Applications [Triple Main]

Sem	Course type	Course code	Course Title	Hrs/ week	Credits	Max Marks	
						ISA	ESA
I	**Common course I**	EN1A01B18	FINE-TUNE YOUR ENGLISH	5	4	20	80
	Core Course (Computer)	CA1B01B18	COMPUTER FUNDAMENTALS AND DIGITAL PRINCIPLES	4	3	20	80
	Core Course (Computer)	CA1B02B18	METHODOLOGY OF PROGRAMMING AND C LANGUAGE	4	3	20	80
	Core Course (Computer)	CA1BP01B18	SOFTWARE LAB -I	4	2	20	80
	Core Course (Mathematics)	MT1B01B18	DISCRETE MATHEMATICS & TRIGONOMETRY	4	3	20	80
	Core Course (Statistics)	ST1B01B18	DESCRIPTIVE STATISTICS	4	3	20	80
Total HOURS & CREDIT				**25**	**18**		
II	**Common course I**	EN2A03B18	ISSUES THAT MATTER	5	4	20	80
	Core Course (Computer)	CA2B03B18	DATABASE MANAGEMANT SYSTEMS	4	3	20	80
	Core Course (Computer)	CA2B04B18	OBJECT ORIENTED PROGRAMMING USING C++	4	3	20	80
	Core Course (Computer)	CA2BP02B18	SOFTWARE LAB II	4	2	20	80
	Core Course (Mathematics)	MT2B02B18	NUMBER THEORY, CRYPTOGRAPHY , LAPLACE TRANFORMS &	4	3	20	80

			CONIC SECTIONS				
	Core Course (Statistics)	ST2B02B18	PROBABILITY AND RANDOM VARIABLES	4	3	20	80
Total HOURS & CREDIT				**25**	**18**		
III	**Core Course (Computer)**	CA3B05B18	DATA STRUCTURES USING C++	4	3	20	80
	Core Course (Computer)	CA3B06B18	OPERATING SYSTEMS	4	4	20	80
	Core Course (Computer)	CA3B07B18	SYSTEM ANALYSIS AND SOFTWARE ENGINEERING	4	3	20	80
	Core Course (Computer)	CA3BP03B18	SOFTWARE LAB III	3	2	20	80
	Core Course (Mathematics)	MT3B03B18	CALCULUS	5	4	20	80
	Core Course (Statistics)	ST3B03B18	PROBABILITY DISTRIBUTIONS	5	4	20	80
Total HOURS & CREDIT				**25**	**20**		
IV	**Core Course (Computer)**	CA4B08B18	LINUX ADMINISTRATION	3	3	20	80
	Core Course (Computer)	CA4B09B18	WEB PROGRAMMING USING PHP	3	3	20	80
	Core Course (Computer)	CA4BP04B18	SOFTWARE LAB IV	4	3	20	80
	Core Course (Mathematics)	MT4B04B18	VECTOR CALCULUS, THEORY OF EQUATIONS & MATRICES	5	4	20	80
	Core Course (Statistics)	ST4B04B18	STATISTICAL INFERENCE	5	4	20	30
	Core Course	ST4B05B18	SAMPLE SURVEY AND	5	4	20	30

	(Statistics)		DESIGN OF EXPERIMENTS				
Total HOURS & CREDIT				**25**	**21**		
V	**Core Course (Statistics)**	ST5B06B18	ENVIRONMENTAL STUDIES, HUMAN RIGHTS AND NUMERICAL METHODS	5	4	20	80
	Core Course (Computer)	CA5B10B18	JAVA PROGRAMMING USING LINUX	4	4	20	80
	Core Course (Computer)	CA5BP05B18	SOFTWARE LAB V	2	3	20	80
	Core Course (Mathematics)	MT5B06B18	REAL ANALYSIS I	5	4	20	80
	Core Course (Mathematics)	MT5B07B18	DIFFERENTIAL EQUATIONS	5	4	20	80
	Open course	COURSE OFFERED BY OTHER DEPARTMENTS		4	3	20	80
Total HOURS & CREDIT				**25**	**22**		
VI	**Core Course (Computer)**	CA6B11B18	COMPUTER NETWORK	5	4	20	80
	Choice Based Core Course (Computer)	CA6B12aB18	DATA MINING	5	4	20	80
		CA6B12bB18	CLOUD COMPUTING				
		CA6B12cB18	SOFT COMPUTING TECHNIQUES				
		CA6B12dB18	DIGITAL IMAGE PROCESSING				
	Core Course (Mathematics)	MT6B09B18	REAL ANALYSIS II	5	4	20	80
	Core Course (Statistics)	ST6B07B18	OPTIMIZATION TECHNIQUES	5	4	20	80
	Project	CA6BPRB18	SOFTWARE DEVELOPMENT LAB (MAIN PROJECT)	5	4	20	80
	Course VIVA	CA6BVB18	COURSE VIVA	-	1	-	100
Total HOURS & CREDIT				**25**	**21**		

Total credits = 120

.

OPEN COURSES

Sl. No.	Semester	Course Code	Course Title
1	V	CA5D01aB18	COMPUTER FUNDAMENTALS,INTERNET & MS OFFICE
2	V	CA5D01bB18	INFORMATICS AND CYBER ETHICS

CHOICE BASED COURSES

Sl. No.	Semester	Course Code	Course Title
1	VI	CA6B12aB18	DATA MINING
2	VI	CA6B12bB18	CLOUD COMPUTING
3	VI	CA6B12cB18	SOFT COMPUTING TECHNIQUES
4	VI	CA6B12dB18	DIGITAL IMAGE PROCESSING

EXAMINATIONS

The external theory examination of all semesters shall be conducted by the College at the end of each semester. Internal evaluation is to be done by continuous assessment

Examinations have two parts: Internal or In-Semester Assessment (ISA) & External or End–Semester Assessment (ESA). The ratio between ISA and ESA shall be 1:4. Both internal and external marks are to be rounded to the next integer.

MARKS DISTRIBUTION FOR END-SEMESTER ASSESSMENT (ESA) AND IN-SEMESTER ASSESSMENT (ISA)

Marks distribution for ESA and ISA and the components for internal evaluation with their marks are shown below:

Components of the internal evaluation and their marks are as below.

For all courses without practical

a) End–Semester Assessment (ESA): 80 marks
b) In-Semester Assessment (ISA): 20 marks

ISA - Theory	**Marks**
Attendance	**5**
Assignment/Seminar/Viva	**5**
Test papers (2 x 5)	**10**
Total	**20**

Attendance:

% of Attendance	**Marks**
>90%	**5**
Between 85 and 90	**4**
Between 80 and 85	**3**
Between 75 and 80	**2**
75 %	**1**
< 75	**0**

FOR PROJECTS/ COURSE VIVA-VOCE*:

The project topic shall be chosen from areas of current day interest using latest packages / languages running on appropriate platforms (Except the tools used in software development-I), so that the student can be trained to meet the requirements of the Industry. A project report should be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

Scheme of Evaluation for Software Development Lab (MAIN PROJECT) external is as follows:

Division of Marks

Project demonstration and Presentation	**-40 marks**
Viva related to project	**-20 marks**
Project report with proper content and binding	**-20 marks**
Total Marks	**-80marks**

* Bonafide reports of the project work or Industrial Visit conducted shall be submitted at the time of examination.

All the four components of the ISA are mandatory.

Components of Project ISA	**Marks**
Attendance	5
Lab Involvement	3
2 Practical Test	5+5=10
Record	2
Total	**20**

ASSIGNMENTS

Assignments are to be done from 1st to 4th Semesters. At least one assignment should be done in each semester for all courses.

SEMINAR / VIVA

A student shall present a seminar in the 5th semester and appear for Viva- voce in the 6th semester for all courses.

IN-SEMESTER ASSESSMENT - TEST PAPERS

Two internal test- papers are to be attended in each semester for each paper. The evaluations of all components are to be published and are to be acknowledged by the students. All documents of internal assessments are to be kept in the college for two years. The responsibility of evaluating internal assessment is vested on the teachers who teach the course.

END-SEMESTER ASSESSMENT:

The End-Semester examination of all courses shall be conducted by the College on the close of each semester. For reappearance/ improvement, students can appear along with the next batch.

Pattern of Question Paper:

A question paper shall be a judicious mix of short answer type, short essay type/ problem solving type and long essay type questions.

For each course the End-semester Assessment is of 3 hours duration. The question paper has 3 parts. Part A contains 12 objective type questions of which 10 are to be answered .Part B contains 9 short essay questions of which 6 are to be answered. Part C has 4 long essay questions of which 2 are to be answered.

Part	**No. of Questions**	**No. of questions to be answered**	**Marks (for courses with practical)**	**Marks (for courses without practical)**
A (Short Answer type)	12	10	10 x 1 = 10	10 x 2 = 20
B (Short Essay)	9	6	6 x 5 = 30	6 x 5 = 30
C (Long Essay)	4	2	2 x 10 =20	2 x 15 = 30

PATTERN OF QUESTION PAPERS

Pattern of questions for end-semester assessment of practical papers will be decided by the concerned Board of practical examination.

GRADES

A 7-point scale based on the total percentage of marks (ISA + ESA) for all courses (theory, practical, project)

% of marks	Grade	Grade point
>95	S - Outstanding	10
85 - 95	A^+ - Excellent	9
75 - 85	A - Very good	8
65 - 75	B^+ - Good	7
55 - 65	B - Above average	6
45 - 55	C - Satisfactory	5
35 - 45	D - Pass	4
<35	F - Failure	0
	Ab - Absent	0

PASS CRITERIA:

- A separate minimum of 30% marks each for ISA and ESA (for both theory and practical) and aggregate minimum of 35% is required for a pass in a course.
- For a pass in a programme, a separate minimum of Grade D is required for all the individual courses.
- If a candidate secures F Grade for any one of the courses in a semester/programme, only F grade will be awarded for that semester/programme until she improves this to D Grade or above within the permitted period.
- Students who complete the programme with D grade will have one betterment chance within 12 months, immediately after the publication of the result of the whole programme.

CREDIT POINT AND CREDIT POINT AVERAGE

Credit Point (CP) of a course is calculated:

$CP = C \times GP$

C = Credit; GP = Grade point

Semester Grade Point Average (SGPA) of a semester:

$SGPA = TCP/TC$

TCP = Total Credit Point of that semester

TC = Total Credit of that semester

Cumulative Grade Point Average (CGPA) is calculated:

$CGPA = TCP/TC$

TCP = Total Credit Point of that programme
TC = Total Credit of that programme

GRADE POINT AVERAGE (GPA)

GPA of different category of courses viz. Common courses, Complementary courses, Core courses etc. are calculated:
GPA = TCP/TC
TCP = Total Credit Point of a category of course
TC = Total Credit of that category of course
Grades for the different courses, semesters and overall programme are given based on the corresponding GPA

GPA	Grade
>9.5	**S - Outstanding**
8.5 – 9.5	**A^+ - Excellent**
7.5 – 8.5	**A - Very good**
6.5 – 7.5	**B^+ - Good**
5.5 – 6.5	**B - Above average**
4.5 – 5.5	**C - Satisfactory**
3.5 – 4.5	**D - Pass**
<3.5	**F - Failure**

- For reappearance/improvement of I, II, III & IV semesters, candidate have to appear along with the next batch.
- There will be supplementary exams for V sem in the respective academic year.
- Notionally registered candidates can also apply for the said supplementary examinations.
- A student who registers her name for the end semester assessment for a semester will be eligible for promotion to the next semester.
- A student who has completed the entire curriculum requirement, but could not register for the Semester examination can register notionally, for getting eligibility for promotion to the next semester.
- A candidate who has not secured minimum marks/credits in ISA can re-do the same registering along with the ESA for the same semester, subsequently
- There shall be no improvement for internal evaluation

SYLLABI
FOR
CORE COURSE
COMPUTER

SYLLABUS FOR CORE COURSES

COMPUTER APPLICATIONS

SEMESTER I
CA1B01B18 : COMPUTER FUNDAMENTALS AND DIGITAL PRINCIPLES

Credits: 3

Total Lecture Hours: 72

Aim of the course:

- To explain and apply the basic concepts of number systems and the use of Binary, Decimal and Hexadecimal number systems, and demonstrate competence in the conversion of numbers from one representation to another.
- To define the basic logic gates, such as AND, OR NOT in terms of Truth Tables and utilize Truth Tables to prove the functionality of simple gate networks. Explain the universality of NAND and NOR gates.
- To demonstrate familiarity with Boolean Operations, the Laws of Boolean Algebra, DeMorgan's Theorems and the application of Boolean Algebra and Karnaugh Maps to simplify logic circuits.
- To describe and employ Combinatorial Logic to create Adders, Comparators, Decoders, Encoders, Multiplexers and De-multiplexers.
- To implement flip-flops and related storage devices, use sequential logic to create counters, registersTo explain and describe the basic memory components of a computer

Course Overview and Context:

Introduction to the basics of digital systems and their design; the analysis of digital circuits using Boolean Algebra and logic reduction; concepts of memory systems and examination of the various designs, flip-flops, counters. Introduction to memory systems, micro-processors and computer architecture. This is a core course for the students to gain more insights to the actual working principles of computing systems.

Syllabus Content:

Module I:(12 Hrs)

Introduction: Functional units of a computer system, Different types of computers, Computer Software and Hardware, Types of software-System software and Application program. Characteristic of computers. Input Devices – Keyboard, Mouse, Optical input

devices, Output devices – Monitors and Printers, Primary& Secondary Memory

Module II:(15 hrs)

Introduction to Operating Systems and Networking: Definition of an Operating System - Different types of PC Operating Systems. Computer Networks- categories of networks - LAN,WAN, MAN. The Internet - Working of Internet - Major Features of Internet.

Module III:(15 hrs)

Number Systems: Base or radix ,Positional number system, Popular number systems(Decimal, Binary, Octal and Hexadecimal), Conversion-From one number system to another, Concept of binary addition and subtraction, Complements in binary number systems,1^S Complement, 2^S Complement and their applications, Signed magnitude form, BCD numbers- concept and addition, Parity.

Module IV:(15 hrs)

Boolean Algebra and Gate Networks: Logic gates- AND, OR, NOT, NAND and NOR Truth tables and graphical representation, Basic laws of Boolean Algebra, Simplification of Expressions, De Morgans theorems, Dual expressions, Canonical expressions, Min terms and Max terms, SOP and POS expressions, Simplification of expression using K-MAP (up to 4 variables), Representation of simplified expressions using NAND/NOR Gates, Dont care conditions, XOR and its applications, parity generator and checker.

Module V:(15 hrs)

Sequential and Combinational Logic. Flip flops- Latch, Clocked, RS, JK, T, D and Master slave , Adders-Half adder, Full adder(need and circuit diagram), Encoders, Decodes, Multiplexers and Demultiplexers (working of each with diagram), Analog to digital and digital to analog converters (Diagram and working principle), : Concept of Registers, Shift Registers, Counters.

Competencies

C1 :Convert a given number from one system to an equivalent number in another system.

C2 : Illustrate the construction of a binary code.

C3 : Determine the output and performance of given combinational and sequential circuits.

C4 : Describe the significance of different criteria for design of digital circuits.

C5 : Compare the performances of various combinational and sequential circuits.

C6 : Able to analyze, design and evaluate digital circuits, of medium complexity.

Books of study:

1. Peter Nortons- Introduction to Computers, Sixth Edition, Published by Tata McGraw Hill

2. P K Sinha & Priti Sinha - Computer Fundamentals, Fourth Edition, BPB Publications.

3. M Morris Mano-Digital Logic and Computer design, Fourth Edition, Prentice Hall.

References:

1. Thomas C Bartee- Digital computer Fundamentals, Sixth Edition, TATA McGraw Hill Edition

2. Thomas L Floyd- Digital Fundamentals, Ninth edition, PEARSON Prentice Hall.

3. Malvino & Leach- Digital Principles and Applications, Sixth Edition, Tata McGraw Hill, 2006

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Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	**3**	**1**	**1**
II	**3**	**2**	
III	**2**	**2**	**1**
IV	**2**	**2**	**1**
V	**2**	**2**	**1**
Total	**12**	**9**	**4**

MODEL QUESTION PAPER
B.Sc. DEGREE EXAMINATION
First Semester
Core Course –Computer
CA1B01B18 – COMPUTER FUNDAMENTALS AND DIGITAL PRINCIPALS
Time: 3 hours

Max.: 80 marks

Part A (Short Answer Questions)
Answer ***any ten*** questions.
Each question carries 2 marks.

1. Define control unit.
2. Explain Mainframe computer.
3. What is an Assembler?
4. What is an OS?
5. Explain Topology.
6. Expand MAN.
7. Find Decimal equivalent of $(AFD5)_{16}$
8. Explain EBCDIC.
9. Explain Redundany in Boolean alebra
10. What is Absorption law.
11. Explain Decoder.
12. Explain what is a Latch.

Part B (Short Essay Questions)
Answer any ***six*** questions.
Each question carries 5 marks.

13. Explain Functional Unit of Computer with a neat diagram.
14. Explain instruction execution and sequencing.
15. Explain Master-Slave JK flip-flop.
16. Convert the boolean expression (AB+AC'+B'C) into canonical SOP form.
17. Discuss the steps to convert OCTAL number to HEXADECIMAL number.
18. Explain digital to analog conversion techniques.
19. Discuss XOR and its applications.
20. Explain excitation table of flip-flops.
21. Explain types of memory.

Part C (Essay Questions)

Answer any ***two*** questions.

Each question carries 15 marks.

22. Explain different types of computer.
23. Explain
    a) Explain K map.

    b) Simplify using K-map X=AB'C+A'BC+A'B'C+AB'C'
24. Explain Basic, Universal and combinational logic gates with truth tables and logic symbols
25. Explain various registers

SEMESTER I
CA1B02B18 : METHODOLOGY OF PROGRAMMING AND C LANGUAGE

Credits: 3

Total Lecture Hours: 72

Aim of the course:

- The course is aimed to develop problem-solving strategies, techniques and skills that can be applied to computers and problems in other areas which give students an introduction to computer and analytical skills to use in their subsequent course work and professional development.
- To act as an introduction to the thinking world of computers, to help students develop the logic, ability to solve the problems efficiently using C programming. Knowledge in a programming language is prerequisite to the study of most of computer science courses. This knowledge area consists of those skills and concepts that are essential to problem solving and programming practice independent of the underlying paradigm.

Course Overview and Context:

C is a widely used language in systems programming. It's a language with lot of capabilities. This subject gives an introduction to programming and basic elements of programming like algorithm, flow chart and Pseudo code. The subject starts with the features of C language and basic elements of the language. Programming constructs like if, for, while and do while are dealt with its syntax and applications. Advanced features like functions, arrays, pointers, structures and unions are also dealt here. Pointer being an important concept is dealt with respect to arrays, structures and functions. The concept of files and preprocessors are also introduced. In general, the subject concentrates in all the areas of C programming which is very much helpful for a beginner in Computer Programming.

Syllabus Content

Module I (12 hrs)

Introduction to programming, Classification of computer languages, Language translators (Assembler, Compiler, Interpreter), Linker, Characteristics of a good programming language, Factors for selecting a language, Subprogram, Purpose of program planning, Algorithm, Flowchart, Pseudocode, Control structures (sequence, selection, Iteration), Testing and debugging.

Module II (15 hrs)

C Character Set, Delimiters, Types of Tokens, C Keywords, Identifiers, Constants, Variables, Rules for defining variables, Data types, C data types, Declaring and initialization of variables, Type modifiers, Type conversion, Operators and Expressions- Properties of operators, Priority of operators, Comma and conditional operator, Arithmetic operators, Relational operators, Assignment operators and expressions, Logical Operators, Bitwise operators

Module III (15 hrs)

Input and Output in C – Formatted functions, unformatted functions, commonly used library functions, Decision Statements If, if-else, nested if-else, if-else-if ladder, break, continue, goto, switch, nested switch, switch case and nested if. Loop control-for loops, nested for loops, while loops, do while loop.

Module IV (15 hrs)

Array, initialization, array terminology, characteristics of an array, one dimensional array and operations, two dimensional arrays and operations. Strings and standard functions, Pointers, Features of Pointer,

Pointer and address, Pointer declaration, void wild constant pointers, Arithmetic operations with pointers, pointer and arrays, pointers and two dimensional arrays.

Module V (15 hrs)

Basics of a function, function definition, return statement, Types of functions, call by value and reference. Recursion -Types of recursion, Rules for recursive function, direct and indirect recursion, recursion vs iterations, Advantages and disadvantages of recursion. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef, bitfields , enumerated data types, Union, Dynamic memory allocation, memory models, memory allocation functions.

Competencies

C1 :Understand the problem and identify the tools and programming structure to logically solve the problem.

C2 : Understand the basic concepts of programming language C including variables and operators.

C3 :Choose appropriate conditional and iteration constructs for a given programming task.
C4 : Apply the techniques of structured (functional) decomposition to break a program into smaller pieces.

C5 : Understand memory management using pointers.

C6 : Design, implement, test, and debug a program that uses each of the following fundamental programming constructs: basic computation, simple I/O, standard conditional and iterative structures, and the definition of functions.

Book Of Study:

1. Ashok Kamthane - Programming in C, Third Edition, Pearson Education

2. P K Sinha & Priti Sinha - Computer Fundamentals , Fourth Edition, BPB Publications.

Reference Text

1. E. Balaguruswamy -Programming in ANSI C ,Seventh Edition , McGraw Hill Education
2. Byron Gotfried - Programming with C, Second Edition, Schaums Outline series. McGraw

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Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	**3**	**1**	**1**
II	**3**	**2**	
III	**2**	**2**	**1**
IV	**2**	**2**	**1**
V	**2**	**2**	**1**
Total	**12**	**9**	**4**

MODEL QUESTION PAPER
B.Sc. DEGREE EXAMINATION
First Semester
Core Course –Computer
CA1B02B18 – METHODOLOGY OF PROGRAMMING AND C LANGUAGE

Time: 3 hours Max.: 80 marks

Part A (Short Answer Questions)

Answer ***any ten*** questions.
Each question carries 2 marks.

1. Explain Testing.
2. What is a Pseudo code.
3. Explain Linker
4. Explain Bitwise operator.
5. Explain Rules for creating identifiers.
6. Explain Type Conversion.
7. Explain setw() in c.
8. Explain any 2 string functions.
9. Explain Goto statements.
10. What is recursion?
11. Explain Enumerated datatype.
12. Explain Realloc().

Part B (Short Essay Questions)

Answer any ***six*** questions.
Each question carries 5 marks.

13. Explain characteristics of good programming.
14. Explain different language translator.
15. Explain priority and associativity related to operators.
16. Explain different if statements.
17. Explain switch statement.
18. Differentiate union and structure.
19. Explain pointer to function.
20. Differentiate call by value and call by reference.
21. Explain Logical Operators.

Part C (Essay Questions)

Answer any ***two*** questions.
Each question carries 15 marks.

22. Explain different ways of passing method overloading.
23. Explain different control structures in C.
24. Explain Pointer addition with a example program
25. Explain dynamic memory allocation methods in C

SEMESTER I
CA1BP01B18 : SOFTWARE LAB-I

Credits: 2

Total Lecture Hours: 72

1. Programs to familiarize printf() and scanf() functions.
2. Programs Based on Decision statements , break, goto, continue, switch and Loop controls statements.
3. Programs Based on One dimensional and two dimensional arrays.
4. Programs on Strings and string handling functions.
5. Programs based on Pointers, operations on pointers, Arrays & Pointers,
6. Programs based on functions, Call by value, Call by reference, Recursion,
7. Programs based on structure and union, array of structures, Pointer to structure, structure and functions
8. Simple programs using pointers and malloc().

Scheme of Evaluation for software lab I external is as follows: Division of Marks
(Practical - 3 hours External)

First program from part 1& 2 **25 marks**

1.Flowchart - 5 marks

2.Logic – 10 marks

3.Successful compilation – 5 marks

4.Result – 5 marks

Second program should be based on advanced concepts , part 3 to part 5 **- 35 marks**

1.Logic – 20 marks

2.Successful compilation – 10 marks

3. Result – 5 marks)

Viva Voce **- 10 marks**
Lab Record (minimum of 25 Programs) **- 10 marks**
Total Marks **- 80 marks**

SEMESTER II
CA2B03B18 : DATABASE MANAGEMENT SYSTEMS

Credits: 3

Total Lecture Hours: 72

Aim of the course:

At the end of the course, the students will be able to understand the fundamentals of database development and management. Upon successful completion of the course, the students will also be able to design and create database, define queries for database management and data retrieval. Students shall be able to learn and apply the basic database concepts in real world applications.

Course Overview and Context:

The main aim of the course is to introduce database fundamentals to the students. With this course we shall demonstrate database development activities and prepare students for proficiency in developing database for commercial applications. The subject deals with what is a database and how a database should be designed. It also deals the popular relational data model and SQL queries in depth. It also concentrates on various techniques for database protection and query optimization. A brief introduction about network and hierarchical data model gives exposure about how a DBMS can be designed. The subject also deals with distributed databases in brief.

Syllabus Content

Module I: Introduction (12 hrs)

Characteristics of the Database Approach – Database users -DBA , Database Designers ,End users – Advantages of using the DBMS Approach – Data models, Schemas, and Instances – Three- Schema Architecture and Data Independence.

DBMS Languages: DDL, DML – The Database System Environment: DBMS Component Modules.

Module II: Relational Model (16 hrs.)

Entity Relationship Modeling: Introduction –Entity Types, Entity Sets, Attributes and Keys – Relationship Types ,Relationship Sets, Roles , and Structural Constraints – Weak Entity Types – Notation for ER diagrams – Sample ER diagrams.

Relational Model concepts: Domains ,Attributes, Tuples, and Relations – Characteristics of Relations – Relational Model Constraints and Relational Database Schemas : Domain Constraints, Key Constraints , Relational Database Schemas , Entity Integrity ,

Referential Integrity, and Foreign Keys .

Module III: SQL(14 hrs.)

Data Types – Data Definition commands : CREATE , ALTER ,DROP - Adding constraints in SQL – Basic SQL Queries : INSERT ,SELECT ,DELETE ,UPDATE - Substring comparison using LIKE operator ,BETWEEN operator – Ordering of rows – SQL set operations UNION , EXCEPT , INTERSECT – Complex Queries : Comparison involving NULL and Three-valued logic, Nested queries , EXISTS and UNIQUE functions, Renaming of attributes and Joining of tables, Aggregate functions ,Grouping – Managing Views.

Module IV: Normalization and Indexing Structures for Files(15 hrs.)

Normalization: Informal Design Guidelines for Relational Schemas –Functional Dependencies – Normal forms : First Normal Form , Second Normal Form , Third Normal Form – General Definitions of Second and Third Normal Forms –BCNF.

Indexing Structures for files: -Types of Single-Level Ordered Indexes: Primary Indexes, Clustering Indexes, and Secondary Indexes.

Module V: Transaction Processing and Database Security (15 hrs.)

Transaction Processing: Introduction to Transaction Processing - Transaction and System Concepts – Desirable properties of Transactions.

Database Security and Authorization: Types of Security – Control measures – Database Security and DBA – Access Control , User Accounts, and Database Audits –Access Control based on Granting and Revoking Privileges.

Course Competencies

C1 : Understand, appreciate and effectively explain the underlying concepts of database technologies
C2 : Design and implement a database schema for a given problem-domain
C3 : Normalize a database
C4 : Populate and query a database using SQL DML/DDL commands.
C5 : Programming PL/SQL including stored procedures, stored functions, cursors, packages.
C6 : Declare and enforce integrity constraints on a database using RDBMS

***Books of study*:**

1.Ramez Elmasri and Shamkant B.Bavathe - DATABASE SYSTEMS , Sixth Edition, Pearson Education.

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***References**:*

1. C.J Date- An Introduction to Database Systems, Eighth edition, Pearson Education,2003

2. Reghu Ramakrishnan and Johannes Gehrke- Database Management Systems , Third edition, Mc Graw Hill International Edition.
3. Dipin Desai , An Introduction to Database Systems , First Edition, Galgoria Publications

BLUE PRINT

Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	**3**	**1**	**1**
II	**3**	**2**	
III	**2**	**2**	**1**
IV	**2**	**2**	**1**
V	**2**	**2**	**1**
Total	**12**	**9**	**4**

SEMESTER II
CA2B04B18 : OBJECT ORIENTED PROGRAMMING USING C++

Credits: 3

Total Lecture Hours: 72

Aim of the course:

- Demonstrate a thorough understanding of the object-oriented programming concepts of encapsulation, data abstraction and composition by designing and implementing classes including the use of overloaded functions and constructors.
- Demonstrate a thorough understanding of the concept of pointers and dynamic memory allocation by designing and implementing programs using pointers and dynamic memory allocation.
- Demonstrate a thorough understanding of the implementation of programmer-defined functions and classes by writing code, performing unit testing and debugging of multiple complex programs.
- Demonstrate a thorough understanding of stream input/output for both console and files.
- Demonstrate a thorough understanding of stream input/output for both console and files.

Course Overview and Context:

- This course provides a solid foundation for object-oriented programming using the C++ programming language.. The major emphasis of this course is on the most effective use of the advanced language features, presented in the context of modern software engineering themes of modularity, abstraction, information hiding, and reusability. Fundamental principles of object-oriented design and programming are also introduced.

Syllabus Content

Module I: Principles of Object Oriented Programming, Beginning with C++(12 hrs)

Procedure Oriented Programming-Object Oriented Programming-Basic concepts of object-oriented programming- Benefits of OOP- Applications of OOP-A simple C++program-Structure of C++ program- C++ data types- Symbolic constants- Reference by variables-Operators in C++- Operator precedence- Control structures- Function in C++ - The main function, Function prototyping- Call by reference- Return by reference- Inline function-Default arguments- Function overloading.

Module II: Classes and Objects (15 hrs)

Specifying a class- Defining member functions- Nesting of member functions -Private member functions - Arrays within a class - Memory allocation for objects-Static data

members -Static member functions - Arrays of objects - objects as function arguments - Friendly functions- Returning Objects.

Module III: Constructers and Destructors, Overloading (15 hrs)

Constructors- Default constructor-Parameterized constructor-Copy constructor- Multiple constructors- Constructors with default arguments- Dynamic constructor-Destructors- Operator overloading- Unary and Binary operator overloading- Overloading using friends- Rules for overloading- Type conversion.

Module IV: Inheritance (15 hrs)

Inheritance- Defining derived classes-Visibility modes-Single, Multilevel, Multiple, Hierarchical And Hybrid inheritance- Virtual base classes- Abstract classes- Constructors in derived classes- Nesting of classes.

Module V: Pointers, Virtual Functions and Polymorphism, Working with Files (15 hrs)

Pointers- Pointers to objects- this pointer-Pointers to derived classes- Virtual functions- Pure virtual functions- File Stream classes, Opening and closing a file- File opening modes- File pointers and their manipulations- Sequential input and output operations.

Competencies

C1 : Understand basic object-oriented programming concepts

C2 : Effectively use the main features of the object-oriented programming language C++.

C3 : Gain experience in implementing object-oriented programs in C++, in particular, a real system example.

Book of Study:

1. E. Balagurusamy - Object Oriented Programming with C++, Fifth edition, Tata McGrawEducation Hill , 2011.

Reference:

1. Ashok N. Kamthane, Object oriented Programming with ANSI & Turbo C++, First Edition, Pearson India

2. Robert Lafore, Object Oriented Programming in Turbo C++, First Edition, Galgotia Publications.

3. D Ravichandran, Programming with C++, Second edition, Tata McGraw- Hill

BLUE PRINT

Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

SEMESTER II
CA2BP02B18 : SOFTWARE LAB II

Credits: 2

Total Lecture Hours: 72

I. SQL Commands (2 hrs. per week)

1. Data definition commands - CREATE, ALTER, DROP, Adding Constraints Primary key, foreign key, unique key, check, not null.
2. Basic SQL queries INSERT, SELECT, DELETE, UPDATE, Using multiple tables, ordering of
   rows using ORDER BY option, Set operations using UNION, EXCEPT, INTERSECT, Substring Comparison using LIKE operator, BETWEEN operator.
3. Complex Queries Nested Queries, EXISTS and UNIQUE/DISTINCT functions, NULL values, Renaming of attributes and Joining of tables, Aggregate functions and grouping.
4. Managing views, Simple stored procedures.
5. Data Control commands - Access Control and Privilege commands.

II. Object Oriented Programming using C++ (3 hrs. per week)

1. Programs based on default arguments, function overloading.
2. Programs based on array of objects, friend functions, passing objects as arguments to function.
3. Programs based on operator overloading (binary, unary) using member functions and friend functions.
4. Programs based on constructors, different types of constructors.
5. Programs based on inheritance, different types of inheritance.

Scheme of Evaluation for software lab II external is as follows:

(There will be two questions; the first from DBMS and second from C++)

Division of Marks (Practical - 3 hours External)

First program - questions from DBMS **- 25 marks**

1. Logic – 10 marks

2.Successful compilation – 8 marks

3. Result – 7 marks

Second program – questions from Object Oriented Programming using C++ **- 35 marks**

1. Logic – 20 marks

2.Successful compilation –10 marks

3. Result – 5 marks

Viva Voce **- 10 marks**
Lab Record **- 10 marks**
(DBMS -Minimum of 10 Programs C++ -Minimum: of 15 Programs)

Total Marks **- 80 marks**

SEMESTER III

CA3B05B18 : DATA STRUCTURES USING C++

Credits: 3

Total Lecture Hours: 72

Aim of the course:

- Demonstrate a familiarity with major algorithms and data structures.
- To introduce the basic techniques of algorithm analysis.
- Be familiar with several sorting algorithms including bubble sort, selection sort and searching algorithms such as linear search and binary search.
- Master the implementation of linked data structures such as linked lists and binary trees
- Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues etc.

Course Overview and Context:

This course introduces the design of data structures for representing information in computer memory. Topics include: Abstract data types and their implementations; Stacks; Queues; Priority queues; Sorting; Recursion.This course assumes that students know how to analyze simple algorithms and data structures. It introduces students to the design of computer algorithms, as well as analysis of sophisticated algorithms.

Syllabus Content

Module I (12 hrs)

Concept of Structured data - Data structure definition, Different types and classification of data structures, Arrays – Memory allocation and implementation of arrays in memory, array operations, Applications - sparse matrix representation and operations, polynomials representation and addition, Concept of search and sort – linear search, binary search, selection sort, insertion sort, quick sort.

Module II (15 hrs)

Stacks – Concepts, organization and operations on stacks using arrays (static), examples, Applications - Conversion of infix to postfix and infix to prefix, postfix evaluation, subprogram calls and execution, Multiple stacks representation. Queues - Concepts, organization and operations on queues, examples. Circular queue – limitations of linear queue, organization and operations on circular queue. Double ended queue, Priority queue.

Module III (15 hrs)

Linked list: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion examples, circular linked list, doubly linked lists, Applications-linked stacks and queues, memory management basic concepts, garbage collection.

Module IV (15 hrs)

Trees - Concept of recursion, trees, tree terminology, binary trees, representation of binary trees, strictly binary trees, complete binary tree, extended binary trees, creation and operations on binary tree, binary search trees, Creation of binary search tree, tree traversing methods – examples, binary tree representation of expressions.

Module V (15 hrs)

File - Definition, Operations on file (sequential), File organizations - sequential, Indexed sequential, random files, linked organization, inverted files, cellular partitioning, hashing – hash tables, hashing functions, collisions, collision resolving methods, Algorithms.

Course Competencies

C1 : Show how data structures map onto physical memory.

C2 : Identify linear versus nonlinear data structures.

C3 : Manipulate data structures with basic operations.

C4 : Compare different implementations of the same data structure.

C5 : Gain a thorough knowledge of different techniques for calculating a hash function.

C6 : Understand different algorithm analysis method

Books of Study :

1. G.S Baluja - Data Structures Through C++ (A Practical Approach), Second Edition-2004, Danapat Rai & Co.

2. Ellis Horowitz and Sartaj Sahni - Fundamentals of Data Structures in C++ , Second Edition, Galgotia Publications.

References:

1. Seymour Lipschutz, Theory and Problems of Data Structures, Schaums Outline Series,2006, McGraw Hill

2. Yedidyah Langgsam, Moshe Augustein, Aaron M Tenenbaum- Data structures using C and C++ , Second Edition, Prentice Hall

BLUE PRINT

Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	**3**	**1**	**1**
II	**3**	**2**	
III	**2**	**2**	**1**
IV	**2**	**2**	**1**
V	**2**	**2**	**1**
Total	**12**	**9**	**4**

SEMESTER III
CA3B06B18 : OPERATING SYSTEMS

Credits: 4

Total Lecture Hours: 72

Aim of the course:

- To explore the necessary components and functions of operating system
- To give a clear idea on different scheduling algorithms
- Memory management policies handles by OS.
- Deadlock ,Synchronizations Concepts
- Case study about UNIX .

Course Overview and Context:

Operating system is the manager of computer resources.This course is intended to introduce the concepts,structures,features,trends and design mechanism of OS.It covers the fundamentals of multiple operating systems and their associated applications.Students will gain insight into both the difference and similarities between os architecture.

Syllabus Content

Module I: (12 hrs)
Introduction: OS Definition, Functions, Evolution of OS,OS Structure Operating System Operations,Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

Module II:(15 hrs)
Process: Basic Concepts, Process Scheduling, Operations on Processes, Inter process communication, Process Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

Module III:(15 hrs)
Process Coordination: Synchronization - The Critical Section problem, Semaphores, Classic Problems of Synchronization, Monitors. Deadlocks: System Model, Deadlock Characterization, Methods of handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Module IV: (15 hrs)
Memory Management: Memory Management Strategies - Swapping, Contiguous memory allocation,Paging, Segmentation. Virtual Memory Management- Demand paging, Page Replacement.

Module V: (15 hrs)

Storage Management: File System: - File Concept, Access Methods, Directory structure. Implementing File Systems:-File System Structure, Allocation Methods, Free Space Management, Disk Scheduling.

Book of study:

1. Abraham Silberschatz, Peter Galvin and Greg Gagne - Operating System Principles, Seventh Edition, John Wiley
2. William Stallings - Operating Systems, Sixth Edition, Prentice Hall of India, Pearson

Reference:

1. Milan Kovic - Operating Systems, 2ndEdition, (TMH)

Course Competencies

C1: Describe the types of OS and its service provided
C2: Describe how an OS manages processes and threads.
C3: Compare and contrast alternative CPU scheduling and threads
C4: Understanding the operating system UNIX

BLUE PRINT

Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

SEMESTER III
CA3B07B18: SYSTEM ANALYSIS AND SOFTWARE ENGINEERING

Credits: 3
Total Lecture Hours: 72

Aim of the course:

- To introduce software process models such as the waterfall and evolutionary models.
- To be familiar with the role of project management including planning, scheduling
- To understand software requirements and the SRS document.
- To understand different software architectural styles.
- To be familiar with implementation issues such as modularity and coding standards.
- To understand the approaches to verification and validation
- To analysis, and make reviews.
- To understand the software testing approaches such as unit tand integration testing.
- To familiarize software evolution and related issues such as version management.
- An understanding on quality control and how to ensure good quality software.
- An understanding of some ethical issues those are for software engineers.

Course Overview and Context:

In this course, students will gain a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

Syllabus Content

Module I: (12 hrs)
Information systems concepts, Business information systems; Describing the business organization – organization chart , organization function list ; information system levels - operational, lower, middle, top management; the system development life cycle concepts; hardware and software end products. Life cycle activities- life cycle flow chart, task, management review, baseline specifications, role of system analyst.

Module II: (15 hrs)

Introduction to Software Engineering - Definition, Program Vs Software, and Software process, Software Characteristics, Brief introduction about product and process, Software process and product matrices. Software life cycle models - Definition, Waterfall model, Increment process models, Evolutionary process models, Selection of a life cycle model.

Module III: (15 hrs)

Software Requirement Analysis and Specification Requirements Engineering type of requirements, Feasibility Studies, Requirement Elicitation, Various steps for requirement analysis, Requirement documentation, Requirement validation, an example to illustrate the various stages in Requirement analysis. Project planning-Size estimation, cost estimation, the constructive cost model (COCOMO).

Module IV: (15 hrs)

Software Design - Definition, Various types, Objectives and importance of Design phase, Modularity, Strategy of design, Function oriented design, IEEE recommended practice for software design descriptions. Steps to Analyze and Design Objected Oriented System. Software Reliability Definition, McCall software quality model, Capability Maturity Model.

Module V: (15 hrs)

Software Testing What is testing?, Test, Test case and Test Suit, Verification and Validation, Alpha, beta and acceptance testing, functional testing, techniques to design test cases, boundary value analysis, Equivalence class testing, decision table based testing, cause effect graphing technique, Structural testing path testing, Graph matrices, Data flow testing; Levels of testing Unit testing, integration testing, system testing, validation testing, a brief introduction about debugging and various testing tools.

Course Competencies

C1 : Understand the Organization structure.
C2 : Identify software requirements specifications.
C3 : Exhibit software analysis and design skills.
C4 : Exhibit Implementation skills.
C5 : Exhibit project management skills.
C6 : understand the quality management criteria

Book of Study:

1. Marvin Gore & John Stubbe -Elements Of System Analysis, Fourth Edition, Galgotia Book Source.

2. K K Aggarwal, Yogesh Singh - Software Engineering,Third Edition, New Age International Publications.

References :

1. Roger S Pressman - Software Engineering: A Practitioner's Approach, Sixth Edition, McGraw-Hill Higher Education.
2. Ian Sommerville - Software Engineering , Seventh Edition, Pearson Education.
3. Pankaj Jalote - An Integrated approach to Software Engineering, Second Edition, Narosa Publishing Company.

BLUE PRINT

Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

SEMESTER III

CA3BP03B18: SOFTWARE LAB III

Credits: 2
Total Lecture Hours: 54

Syllabus Content

Module I (14 hrs)

Array – Insertion , Deletion, Polynomial addition using arrays

Sort – Selection, Insertion, Quick

Search – Linear search, Binary search

Sparse matrix – Sparse form representation, transpose and addition using the sparse form

Module II (14 hrs)

Stack - Implementation using arrays (linear stack), Infix to postfix conversion, Postfix evaluation

Queue – Implementation using arrays (linear queue), Implementation of circular queue

Module III (13 hrs)

Singly linked list – Implementation using dynamic memory allocation techniques, arrange the list based on the ascending or descending order of the information field, concatenate two linked lists, interchange any two nodes in a list, Implementation of circular list, Implementation of linked stacks and queues.Doubly linked list – Implementation of doubly linked list, Implementation of circular doubly linked list.

Module IV (13 hrs)

Creation of binary search trees, Insertion and deletion of nodes, Tree traversals.

Scheme of Evaluation for software lab III external is as follows:

(There will be two questions)

Division of Marks (Practical - 3 hours External)

First program - questions from module 1 & II **- 25 marks**

1. Logic – 10 marks

2. Successful compilation – 8 marks

3. Result – 7 marks

Second program – questions from module III & IV **- 35 marks**

1. Logic – 20 marks

3. Successful compilation –10 marks

3. Result – 5 marks

Viva Voce **- 10 marks**
Lab Record **- 10 marks**

(Minimum of 25 Programs)
Total Marks - 80 marks

SEMESTER IV
CA4B08B18: LINUX ADMINISTRATION

Credits: 3
Total Lecture Hours: 54

Aim of the course:

Knowledge of Linux is an essential skill for a wide variety of careers in business and information technology. Many emerging and growing career opportunities including big data, cloud computing, cyber security, information systems, networking, programming and software development require basic to advanced knowledge of the Linux command line. The course curriculum is focused on the following objectives:

- Understand Linux as an operating system
- Explain some of the considerations for choosing an operating system
- Understand some of the basics of open source software and licensing
- Acquire basic knowledge of working with Linux
- Learn basic Linux command line skills
- Learn how to use help commands and navigate help systems when using Linux
- Basics of how to work with Linux files and directories
- Searching and extracting data from Linux files
- Basic understanding of the concept of scripting
- Knowing where data is stored on a Linux system
- Identifying various types of users on a Linux system
- Creating users and groups on a Linux system
- Managing Linux file permissions and ownership
- Understanding special Linux directories and files

Course Overview and Context:
This course covers the fundamentals of the Linux operating system and command line. The goal of this course is to provide a "starting place" for learning the Linux operating system. Individuals who complete this course should understand Linux as an operating system, basic open source concepts, how Linux is used and the basics of the Linux command line and shell programming

Syllabus Content:

MODULE I: (12 hrs)

Overview of Linux: What is Linux, Linux's root in Unix, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux standard directories. Commands for files and directories cd, ls, cp,rm, mkdir, rmdir, pwd, file, more, less, Creating and viewingfiles usingcat,file comparisons.

MODULE II : (15 hrs)

Essential Linux commands: Processes inLinux, process fundamentals, connectingprocesses with pipes, redirectinginput/output, Background processing,managingmultiple processes,process scheduling– (at, batch), nohup command, kill, ps, who, find, sort, touch, file, file processing commands-wc, cut, paste etc Mathematical commands-expr, factor etc. Creating and editing files with vi editor.

MODULE III: (15 hrs)

Shell programming-Basics of shell programming, various types of shell available in Linux, comparisons between various shells, shell programming in bash. Conditional and looping statements, case statement, parameter passing and arguments, Shell variables, system shell variables, shellkeywords, Creating Shell programs forautomating system tasks

MODULE IV: (18 hrs)

System administration-Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managinguseraccounts-adding &deletingusers, changing permissions and ownerships, Creatingand managing groups, modifying group attributes, Temporary disabling of users accounts, creating and mounting file system, checking and monitoring system performance-file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command.

MODULE V: (12 hrs)

Simple filter commands: pr, head, tail, cut, sort, uniq, tr- Filter using regular expression grep, egrep, sed Understanding various Servers**:** DHCP, DNS, Squid, Apache, Telnet, FTP, Samba.

Books of Study:

1) Cristopher Negus-Red Hat Linux Bible, Wiley Dreamtech India 2005edition.
2) Yeshwant Kanethkar- UNIX Shell Programming, First edition, BPB.

References:

1) Official Red Hat Linux Users guide by Redhat, Wiley Dreamtech India

2) Graham Glass & King Ables- UNIX for programmers and users, Third Edition,Pearson Education.

3) Neil Mathew &Richard Stones - Beginning Linux Programming, Fourth edition, Wiley Dreamtech India.

Course Competencies

C1 : Understand concepts and components of Linux.
C2 : Use common Linux commands and utilities for general file system operations.
C3 : Write shell scripts for common shell environments.
C4 : Perform system administration tasks to manage files, software, network, users, services, etc.
C5 : Configure common network/internet services and clients such as web, FTP, SSH

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Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

SEMESTER IV
CA4B09B18: WEB PROGRAMMING USING PHP

Credits: 3
Total Lecture Hours: 54

Aim of the course:

Knowledge of PHP is an essential skill for a wide variety of careers in business and information Technology. Many emerging and growing career opportunities including web designing. The course curriculum is focused on the following objectives:

Course Overview and Context

- To learn the platform neutral fundamentals of secure, dynamic web application development
- To learn how to implement a web application using one specific set of open source server side tools: PHP and MySQL.

Syllabus Content:

MODULE I: (8 hrs)

Introduction to web, WWW architecture, Fundamentals of HTML, text formatting tags, marquee, inserting images, links, lists, creating tables, frames, working with form elements.

MODULE II: (10 hrs)

CSS introduction, <link>and<style>elements, CSS properties, Controlling Fonts, Text formatting, Text-pseudo classes, Selectors, Links, Backgrounds, lists

Introduction to Java Script, Java Script variables, operators, decision control statements, looping, functions, arrays, events, popup boxes-alert, prompt, conform box, built-in objects, writing JavaScript, form validation

MODULE III : (10hrs)

Introduction to PHP, server sides scripting, role of web server software, php comments, variables, echo and print, PHP operators, data types, branching statements, loops, arrays

MODULE IV: (12 hrs)

PHP functions, PHP form, Passing information between pages, $_GET,$_POST, $_REQUEST. String actions, include and require, session and cookie management, error handling in PHP, Object Oriented Programming using PHP

MODULE V : (14 hrs)

Introduction to My SQL, data types, SQL commands-CREATE, UPDATE, INSERT, DELETE, SELECT, PHP functions for MySQL connectivity and operation-mysql_connect,sql_select_db,mysql_query,mysql_fetch_row,mysql_fetch_array,mysql_result, ysql_list_fields, mysql_num_fields, insertion, updation and deletion of data using PHP, displaying data from MySQL in web page.

Books of Study:

1) DaveWMercer,AllanKent,StevenDNowicki,DavidMercer,DanSquier,WankyuChoi-"BeginningPHP", Wiley Publishing, Inc
2) Ivan Bayross-"HTML, DHTML, JavaScript, Pearl & CGI", Fourth Revised Edition, BPB Publication.
3) "Programming PHP", Rasmus Lerdorf and Kevin Tatore, Shroff Publishers&Distributors Pvt.Ltd
4) "Beginning PHP", Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi, Wiley Publishing, Inc

Course Competencies:

C1: Understand the PHP structure
C2: Identify Tags specifications
C3: Understand Data Management

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Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

SEMESTER IV
CA4BP04B18: SOFTWARE LAB IV

Credits: 3

Total Lecture Hours: 54

I. Linux (2 hrs. per week)

Sl. No	Topic andDetails
1	Gettingstarted–Commands
2	The Linux Architecture and command usage– Commands, General-purposeutilities
3	The Filesystem–Commands
4	Process related commands
5	Handling ordinary files, Basic file attributes
6	Thevi editor
7	Simple Filters, Filters using regular expressions-use of grep command
8	Introduction to shellconcept and writingshellscript
9	Introduction to shell concept and writing shell script, Essential Shell Programming
10	User management, monitoring system performance, disk usage etc.

II. Web Programming using PHP (4 hrs. per week)

1) Creatingprograms based on HTML
2) CreatingJavascript based programs
3) Creatingsimple programs based on PHP
4) Programs usingPHP functions
5) Programs based on MYSQL

Scheme of Evaluation for software lab IV external is as follows:

(There will be two questions; the first from LINUX and second from PHP)

Division of Marks (Practical-3 hours External)

First program-questions fromLINUX **-25marks**

1. Logic – 10 marks

2. Successful compilation – 8 marks
3. Result – 7 marks

Second program– questions from PHP **-35marks**

1. Logic – 15 marks
2. Successful compilation –15 marks
3. Result – 5 marks

Viva Voce **- 10 marks**
Lab Record **- 10 marks**

(Minimum of 25 Programs)
Total Marks - 80 marks

SEMESTER V
CA5B10B18: JAVA PROGRAMMING USING LINUX

Credits: 4
Total Lecture Hours: 72
Aim of the course:

This course is designed to give you exposure to basic concepts of object-oriented technology. This course will help in learning to write programs in Java using object-oriented paradigm. Approach in this course is to take Java as a language that is used as a primary tool in many different areas of programming work.

Course Overview and Context:
In this course student will become familiar with features of Java language, they will learn how to write Java code according to Object-Oriented Programming principles, how to design GUI applications and Applets using AWT, how to develop multithreaded and Networking applications and how to create dynamic pages.

Syllabus Content:
MODULE I(12hrs.)

Concepts of Object oriented programming, Benefits of OOP, Features of java. Java environment, java tokens, Constant, variables, datatypes, operators Control Statements-branching statements, looping statements, jump statements, labeled loops.

MODULE II (15hrs.)

Defining a Class, Fields declaration, Method declaration, Creating object, Accessing class members, method overloading, Constructors, constructor overloading, super keyword, static Members, Inheritance, overriding methods, dynamic method dispatch, final (variables, methods and classes), abstract methods and classes, interfaces, visibility control.

MODULE III (15 hrs.)

Arrays- One dimensional arrays, declaration, creation, initialization of arrays, two dimensional arrays, String class. Packages:-java API packages overview(lang, util, io, awt, swing, applet),user defined packages-creating packages, using packages

Exception Handling Techniques-try-catch-throw-throws-finally -Multithreading-creation of multithreaded program-Thread class-Runnable interface, Thread lifecycle.

MODULE IV(15hrs.)

EventHandling-Delegation EventModel-EventClasses-Sources of Events-Event Listeners-Event classes-Swing-architecture, components of swing-JLabel, JButton, JCheckBox, JRadioButton, JList, JComboBox, JTextField, JText Area, JPanel, JFrame, Layout Managers(FlowLayout, Grid Layout, CardLayout,BorderLayout,BoxLayout,NullLayout).

MODULE V (15hrs.)

Applet Fundamentals-applettag, applet lifecycle, passing parameters to applets. Working with graphics-Line, Rectangle, Oval, Arc, colorsetting. JDBC architecture-JDBCconnection, JDBC statement object, JDBC drivers.

Books of study:

1) E. Balagurusamy-Programming with Java, Third Edition, McGraw HillCompanies.
2) K. Somasundaram-PROGRAMMINGIN JAVA2,First Edition, Jaico Publishing House.

References:

1) Patrick Naughton-Java2 The Complete Reference, Seventh Edition:

2) Cay S Horstmann & Gary Cornell-Core Java Volume 1- Fundamentals, Eighth edition.

3) Java6 Programming Black Book 2007 Edition, Dreamtech press.

Course Competencies

C1 : Understand and apply object oriented principles.
C2 : Write a java program using predefined java classes available in JDK.
C3 : Use efficiently conditional and looping constructs in Java code.
C4 : Define and use a class in Java.
C5 : Understand Applets.

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Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	**3**	**1**	**1**
II	**3**	**2**	
III	**2**	**2**	**1**
IV	**2**	**2**	**1**
V	**2**	**2**	**1**
Total	**12**	**9**	**4**

SEMESTER V
CA5BP05B18: SOFTWARE LAB V

Credits: 3
Total Lecture Hours: 36

Syllabus Content:

Part I. Applet, JDBC connection and swing based Programs

Part II (using class and read inputs from keyboard)

Java Programs: Method Overloading-Method Overriding-inheritance-abstract class interfaces-packages-Exception Handling-Multithreading

Scheme of Evaluation for software lab V external is as follows:

(There will be two questions; the first from PartI and second from PartII)

Division of Marks (Practical-3 hours External)

First program-questions from Part I	**-25marks**
1.Logic – 10 marks	
2.Successful compilation – 8 marks	
3. Result – 7 marks	
Second program– questions from Part II	**-35marks**
1.Logic – 20 marks	
2.Successful compilation –10 marks	
3. Result – 5 marks	
VivaVoce	**-10marks**
Lab Record (Minimum of 25 Programs)	**-10marks**
Total Marks	**-80marks**

OPEN COURSES

SEMESTER V
CA5D01aB18: COMPUTER FUNDAMENTALS, INTERNET & MS OFFICE

Credits: 3
Total Lecture Hours: 54

Syllabus Content:

MODULE I: (10 hrs.)

Computer Fundamentals: History, Generations, Classifications, Operating Systems, Types of Networks

MODULE II: (12 hrs.)

The Internet, TCP/IP, IP Addressing, Client Server Communication, Intranet, WWW, Web Browser and Web Server, Hyperlinks, URLs, Electronic Email

MODULE III: (12 hrs.)

Word Processing: Introduction, Microsoft Word, Basic Menus, Formatting the text & paragraph, Working with Index

MODULE IV :(10 hrs.)

Spread Sheet: Introduction, Microsoft Excel, Basic Menus, Formulas, Basic functions, Charts and Graphs.

MODULE V : (10 hrs.)

Microsoft Power Point: Introduction, Basic Menus, Template, Slide Basics, Charts, Adding Multimedia & Animation.

Book of Study:

1. Dinesh Maidasani, Firewall Media-"Learning Computer Fundamentals, MSOffice and Internet & WebTechnology", Lakshmi Publications.

References:

1. Harley Hahn -"Internet Complete Reference", Second Edition, Tata McGraw Hill Education

2. Gary B. Shelly, Misty E. Vermaat- "Microsoft Office2010: Advanced", CENGAGE Learning 2010

BLUE PRINT

Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

OPEN COURSES

SEMESTER V
CA5D01bB18: INFORMATICS AND CYBER ETHICS

Credits: 3
Total Lecture Hours: 54
Syllabus Content:

MODULE I :(10 hrs.)

The Internet, TCP/IP, IP Addressing, Client Server Communication, Intranet, WWW, Web Browser and Web Server, Hyperlinks, URLs, Electronic mail.

MODULE II :(10 hrs.)

Internet as a knowledge repository, academic search techniques, creating cyber presence. Academic websites, open access initiatives, open access publishing models, Introduction to use of IT in teaching and learning-Educational software, Academic services–INFLIBNET, NPTEL, NICNET, BRNET.

MODULE III :(12 hrs.)

Introduction to purchase of technology, License, Guarantee, Warranty, Basic concepts of IPR, copyrights and patents, plagiarism. IT & development, the free software movement

MODULE IV : (12 hrs.)

Cyberspace, information overload, cyber ethics, cyber addictions, cybercrimes– categories – person, property, Government–types-stalking, harassment, threats, security & privacy issues.

MODULE V:(10 hrs.)

Cyber Addiction, Information Overload, Health Issues, e-Waste and Green computing impact of IT on language & culture-localization issues-Unicode-IT and regional languages e-Governance in India, IT for National Integration, Role of IT.

Book of Study:

1. Alan Evans, Kendall Martin, Mary Anne Poatsy -"Technology in Action", Pearson

References:

1. Dinesh Maidasani "Learning Computer Fundamentals, MSOffice and Internet & Web Technology", Firewall Media, Lakshmi Publications.

2. V Rajaraman-"Introduction to Information Technology", Prentice-Hall ofIndia.

3. Barkhsand U. RamaMohan-HTML BlackBook 3. "CyberLaw Crimes", AsiaLaw House,
4. Peter Nortons-Introduction to Computers, Sixth Edition, Published byTata McGraw Hill

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Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

SEMESTER VI
CA6B11B18 – COMPUTER NETWORK

Credits: 4
Total Lecture Hours: 90

Syllabus Content:

Aim of the Course:
To understand the basics of data communication and networking
Course Overview and Context:
The subject introduces the concept of networks, different topologies and network devices. The OSI reference model is dealt to introduce different layers. The layers are discussed in detail in later chapters of the subject. Error detection and correction mechanisms are dealt to give an exposure about how actually the network handles the data. The discussion about routing algorithms gives exposure to the sending of information in a network. Congestion handling is also dealt in the subject.
Course Competencies

C1 : Define the basic concept of data communications

C2 : Explain the fundamentals principles of data communications.

C3 : List the characteristics of the various media used in data communications.

C4 : Relate how data is transmitted in a data communications network.

C5 : Describe protocols used in data communications.

Syllabus Content:

MODULE I: (18 hrs)
Introduction to Networks, Data and signals-analog and digital, periodic analog signals, digital signals, bit rate, baud rate, bandwidth. Transmission impairments- attenuation, distortion and noise. Data communication protocols and standards, Network models - OSI model-layers and their functions. TCP/IP protocol suite.

MODULE II : (18 hrs)
Bandwidth utilization Multiplexing: FDM, TDM, spread spectrum. Transmission Media- guided media and unguided media. Switching: message, Circuit and packet switched networks, datagram networks, virtual- circuit networks.

MODULE III: (18 hrs)
Data link layer: Error Detection and Correction, Framing, flow and error control, Protocols - Noiseless channels (Simplest, Stop and Wait) and Noisy channels (Stop and Wait and Piggy Backing).Multiple Access Protocols. Random Access-ALOHA, CSMA. Wired LANs-IEEE standards, wirelessLANs-Bluetooth, Cellular Telephony

MODULE IV : (18 hrs)
Network layer and Transport layer: Repeaters, Bridges, Gateways and routers. Logical addressing – IPV4 and IPV6 addressing, Internet protocol - IPv4 and IPv6. Connectionless and Connection Oriented Services: UDP and TCP. Congestion Control, Quality of Service.

MODULE V: (18 hrs)
Application layer: HTTP, FTP, SMTP, DNS. Network security: Common Threats- Firewalls (advantages and disadvantages), Cryptography.

Book of study:

1) B. A. Forouzan - Data communication and Networking, Fourth edition-, TMH
2) Andrew S Tanenbaum - Computer Networks, Fourth Edition, Prentice Hall of India.

References :
1. W. Stallings, "Data and Computer Communication", McMillan.
2. J. Martin, "Computer Network and Distributed Data Processing", PHI.
3. W. Stallings, "Local Networks", McMillan.
4. M.Schwertz, "Computer Communication Network Design and Analysis", PHI.
5. S. Keshav, "An Engineering Approach to Computer Networking, Pearson", 2000

BLUE PRINT

Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	**3**	**1**	**1**
II	**3**	**2**	
III	**2**	**2**	**1**
IV	**2**	**2**	**1**
V	**2**	**2**	**1**
Total	**12**	**9**	**4**

SEMESTER VI

CHOICE BASED COURSE

CA6B12aB18: DATA MINING

Credits: 4
Total Lecture Hours: 90
Syllabus Content:

Aim of the Course
A study of the concepts, principles, techniques, and applications of data mining. Topics include data preprocessing, data warehousing and OLAP technology, Apriori algorithm for mining frequent patterns, classification methods (such as decision tree induction, Bayesian classification, neural networks, support vector machines, genetic algorithms), clustering methods (such as k-means algorithm, hierarchical clustering methods, self-organizing feature map), and applications and trends in data mining such as Web, finance, telecommunication, biology and medicine, science and engineering. Social impacts of data mining, such as privacy and data security issues, are also discussed.

Course Overview and Context:
Upon successful completion of the course the student will: *f*

- Be able to understand the concepts, strategies, and methodologies related to the design and construction of data mining *f*
- Be able to comprehend several data preprocessing methods *f*
- Be able to utilize data warehouses and OLAP for data mining and knowledge discovery activities *f*
- Be able to determine an appropriate mining strategy for given large dataset *f*
- Be able to apply appropriate mining techniques to extract unexpected patterns and new rules that are "hidden" in large databases *f*
- Be able to obtain knowledge of current data mining application

MODULE I: (18 hrs.)

Introduction Data Mining, Data Ware House, Transactional Databases, Data Mining Functionalities Characterization and Discrimination, Mining frequent patterns, Association and correlation, Classification and Prediction, Cluster Analysis, Classification of Data Mining Systems, Data Mining Task Primitive, Integration of Data Mining systems, Major issues in Data Mining, Data integration and transformation, Data reduction, Data discretization.

MODULE II: (18 hrs.)

Data Warehouse and OLAP technology Data Warehouse, Multidimensional data Model, Data warehouse architecture, Data Warehouse implementation, OLAP, Data Warehouse and data mining

MODULE III : (18 hrs.)

Association Rules and Classification Concepts Efficient and Scalable Frequent item set Mining methods, Mining various kind of association rules, from association mining to Co-relation analysis, Classification and prediction, Issues, Classification by Decision tree induction, Bayesian Classification, Rule-based classification, Support Vector Machines, Learning from your neighbors, Prediction

MODULE IV: (18 hrs.)

Cluster Analysis Definition, Types of data in cluster analysis, A categorization major Clustering methods- Partitioning methods, K-means and k-medoids, from k-medoids to CLARANS, Hierarchical methods, Density based methods

MODULE V: (18 hrs.)

Mining Complex Data Spatial Data Mining, Multimedia Data Mining, Text Mining and Mining WWW.

Book of study:

1. Jiawei Han and Micheline Kamber - Data Mining - Concepts and Techniques, Second Edition, Elsevier, 2006

Reference:

1. Witten and Frank - Data Mining Practical Machine Learning Tools and Techniques, Second Edition, Elsevier, 2005
2. Soman, Divakar and Ajay, Data Mining Theory and Practice, PHI, 2006
3. Margaret H Dunham- Data Mining –Introductory and Advanced Topics, Fourth Edition, Person 2006

BLUE PRINT

Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

SEMESTER VI

CA6B12bB18: CLOUD COMPUTING

Credits: 4
Total Lecture Hours: 90

Syllabus Content:

Module I (18 hrs)

Introduction:
Historical development, Vision of Cloud Computing, Characteristics of cloud computing as per NIST , Cloud computing reference model ,Cloud computingenvironments, Cloud services requirements, Cloud and dynamic infrastructure, CloudAdoption and rudiments Applications-Satellite Image Processing ,Social networking .

ModuleII (18 hrs)

Cloud Computing Architecture:
Cloud Reference Model, Types of Clouds, CloudInteroperability & Standards, Scalability and Fault Tolerance,Cloud Solutions:CloudEcosystem, Cloud Business Process Management, Cloud Service Management.

Module III (18 hrs)

Cloud Management & Virtualization Technology:
Virtualization: Fundamental concepts of compute, storage, networking, desktopand application virtualization. Virtualization benefits, server virtualization, Block and filelevel storage virtualization.

Module IV (18 hrs)

Cloud Security:
Security risks in cloud, security attacks in virtualization, security solutions in virtualization, securing the cloud, security boundary, CSA cloud reference model with security mechanisms, encryption, establishing identity and presence

Module V (18 hrs)

Market Based Management of Clouds, Federated Clouds/Inter Cloud: Characterization &Definition, Cloud Federation Stack, and Third Party Cloud Services.

Book of Study
Buyya, Selvi ," Mastering Cloud Computing ",TMH Pub

References

Kumar Saurabh, "Cloud Computing" , Wiley Pub

Krutz , Vines, "Cloud Security " , Wiley Pub

Velte, "Cloud Computing A Practical Approach" ,TMH Pub

Sosinsky, " Cloud Computing" , Wiley Pub

BLUE PRINT

Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

SEMESTER VI

CA6B12cB18: SOFT COMPUTING TECHNIQUES

Credits: 4
Total Lecture Hours: 90

Syllabus Content:

MODULE I: (18 hrs)

Soft Computing, Difference between soft computing and hard computing. **Neural Networks:** Basic concepts of Neural Networks, Human Brain, Artificial Neuron model, Activation functions, Neural network architecture, Single layer and multilayer feed forward networks, Recurrent networks, Neural network characteristics, Learning methods, Rosenblatt's perceptron, Perceptron and linearly separable tasks, XOR problem, Neural network applications.

MODULE II: (18 hrs)

Back Propagation Networks: Architecture- perceptron model, solution, single layer artificial neural network, multilayer perception model, back propagation learning- input layer computation, hidden layer computation, output layer computation, calculation of error, Training of neural network, effect of learning rate coefficient, Back propagation algorithm.

MODULE III: (18 hrs.)

Fuzzy Set Theory: Fuzzy versus crisp, Crisp sets, Operations on crisp sets, Properties of crisp sets, Partition and covering, Fuzzy sets, Membership functions, Basic fuzzy set operations, Properties of fuzzy sets, Crisp relations, Operations on crisp relations, Fuzzy relations, Fuzzy cartesian product, Operations on fuzzy relations.

MODULE IV : (18 hrs.)

Fuzzy Systems: Crisp logic, Laws of propositional logic, Inference in propositional logic, Predicate logic, Interpretations of predicate logic formula, Inference in predicate logic, Fuzzy logic, Fuzzy propositions, Fuzzy connectives, Fuzzy quantifiers, Fuzzy inference, Fuzzy rule based system, Defuzzification methods, Applications.

MODULE V: (18 hrs.)

Genetic Algorithm: History, Basic concepts, Biological background, Creation of offsprings, Encoding, Fitness function, Reproduction, **Genetic Modeling**: Crossover, Inversion and deletion, Mutation,Bit-wise operators used in genetic algorithm, Generational cycle, Convergence of a genetic algorithm, Issues and benefits of GA, Application domains.

Book of study:

1. S. Rajasekaran and G.A VijayalakshmiPai- Neural Networks, Fuzzy Logic, and Genetic AlgorithmsSynthesis and Applications, Prentice-Hall of India Pvt.Ltd ,2004.

References:

1. S. N. Sivanandan and S. N. Deepa, Principles of Soft Computing, Wiley India 2nd Ed, 2011.
2. B K Tripathy, J. Anuradha, Soft computing Advances and Applications, Cengage Learning.
3. B Yegnanarayana, Prentice, Artificial Neural Network, Hall of India Pvt.Ltd , 2012.

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Modules	**PART A- (short answer) 2 marks 10/12**	**PART B- (short essay) 5 marks 6/9**	**PART C- (essay/problem) 15marks 2/4**
I	**3**	**1**	**1**
II	**3**	**2**	
III	**2**	**2**	**1**
IV	**2**	**2**	**1**
V	**2**	**2**	**1**
Total	**12**	**9**	**4**

SEMESTER VI

CA6B12dB18: DIGITAL IMAGE PROCESSING

Credits: 4
Total Lecture Hours: 90

Syllabus Content:

MODULE I: (18 hrs.)

Digital Image Fundamentals

Image, Digital Image, Digital image processing-definitions, Examples of fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of Image processing system.

MODULE II : (18 hrs.)

Elements of visual perception

Elements of visual perception- Image Formation, Brightness adaptation and Discrimination, Image sampling and quantization- basic concepts, spatial and Intensity resolution, Basic relationship among Pixels.

MODULE III: (18 hrs.)

Image Enhancement in Spatial and Frequency Domain

Intensity Transformation and spatial Filtering Basics, Intensity transformation functions- Image Negatives, Log Transformations, Power Law Transformations, Histogram Processing, Spatial filtering- correlation and convolution; Fourier transform and frequency domain.

MODULE IV: (18 hrs**)**
Morphological Image Processing

Introduction, basis of set theory, Dilation, Erosion, Structuring elements, Opening and Closing, Hit or miss transformation.

MODULE V: (18 hrs.)

Image Segmentation

Point, Line, Edge detection-detection of isolated points, Basic edge detection- Gradient operators; Pixel based approach-Basics of intensity thresholding, Basic global thresholding; Region based segmentation- region growing, region splitting and merging.

Book of Study:

1. Rafael C. Gonzalez, Richard E. Words- Digital Image Processing, Third Edition, Pearson.

References:

1. Anil K Jain- Fundamentals of Digital Image Processing , Pearson Education.
2. Er. Rishabh Anand, Digital Image Processing, MEDTEC Publications.

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Modules	PART A- (short answer) 2 marks 10/12	PART B- (short essay) 5 marks 6/9	PART C- (essay/problem) 15marks 2/4
I	3	1	1
II	3	2	
III	2	2	1
IV	2	2	1
V	2	2	1
Total	12	9	4

SEMESTER VI

CA6BPRB18: SOFTWARE DEVELOPMENT LAB (MAIN PROJECT)

Credits: 4
Total Lecture Hours: 90

Individual Project.

The project topic shall be chosen from areas of current day interest using latest packages / languages running on appropriate platforms (Except the tools used in software development-I), so that the student can be trained to meet the requirements of the Industry. A project report should be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

Scheme of Evaluation for Software Development Lab II external is as follows: Division of Marks (Software Development Lab II)

Project demonstration and Presentation	**-40 marks**
Viva related to project	**-20 marks**
Project report with proper content and binding	**-20 marks**
Total Marks	**-80marks**

SEMESTER VI

CA6BVB18: COURSE VIVA

Credits: 1

Scheme of Evaluation of Viva voce (Core) for External is as follows:

Each student should attend a course viva voce based on syllabus from semester I to semester VI.

Total Marks – 100 marks

SYLLABI
FOR
CORE MATHEMATICS

MATHEMATICS

BACHELOR'S PROGRAMME
MATHEMATICS (CORE COURSE1) COMMON FOR B.SC MATHEMATICS AND B.SC COMPUTER APPLICATIONS
FIRST SEMESTER

Name of the Course: MT1B01B18-DISCRETE MATHEMATICS & TRIGONOMETRY

Duration: One Semester

Total Credits : 3 Credits

Total Lecture Hours: 72 (4 hours /week)

Aims of the course:

The course aims to introduce Discrete Mathematics & Advanced Trigonometry. One of the strong points of Discrete Mathematics is its powerful applications to fields like Computer Science, engineering and operations research. This course also discusses some advanced topics in trigonometry which has a wide range of applications in the Engineering and construction field.

Course Overview and Context :

This course starts by introducing the alphabets of modern mathematics the mathematical logic and the sets and functions. A brief introduction of theory of Ordered sets & Lattices is also included. The concepts of Circular and hyperbolic functions of a complex variable are then introduced.

Syllabus Content

Module 1 **(20 hrs)**

Mathematical Logic:
Propositional logic, Propositional equivalences, Predicates and quantifiers, Rules of inference, Introduction to proofs.

Text 1: Chapter – 1 excluding sections 1.4 & 1.7

Module 2 **(12 hrs)**

Set theory: Sets, set operations, functions

Text 1: Chapter – 2 excluding section 2.4

Module 3 **(20 hrs)**

Ordered sets & Lattices : Poset, Product set & order, Hasse diagrams of partially ordered sets, Minimal& Maximal, and First & Last point, Lattices, Lattices as partially ordered sets.

(Text book 2, Chapter – 4 (4.1 to 4.6)).

Module 4

Trigonometry : **(20 hrs)**

Circular and hyperbolic functions of a complex variable Separation into real and imaginary parts. Factorisation of x^n-1, x^n+1, $x^{2n} - 2x^n a^n \cos n\theta + a^{2n}$. Summation of infinite series by C + iS method.

(Relevant sections of Text 2, Chapter – V , VII , IX of Text 2)

Learning Resources

Textbook

1. K.H. Rosen: Discrete Mathematics and its Applications (Sixth edition), Tata McGraw Hill Publishing Company, New Delhi.
2. B.S.Vatsa & Suchi Vatsa : Discrete Mathematics (Fourth revised edition), New Age International Publishers, New Delhi.
3. S.L. Loney – Plane Trigonometry Part – II, S. Chand and Company Ltd

References

1. J. P Tremblay and R. Manohar- Discrete Mathematical Structures with applications to computer science, Tata McGraw-Hill Education, 2001
2. Lipschutz: Set Theory and related topics (Second Edition), Schaum Outline Series, Tata McGraw-Hill Publishing Company, New Delhi. (Reprint)
3. P.R. Halmos : Naive Set Theory, Springer.
4. Ian Chiswell & Wifrid Hodges: Mathematical Logic, Oxford university press
5. Richard Johnsonbaugh – Discrete Mathematics (Pearsons).
6. Ralph P. Grimaldi, B.V.Ramana; Discrete And Combinatorial Mathematics ; Pearson Education; Dorling Kindersley India Pvt. Ltd

7. Winfried Karl Grassman, Jean-Paul Tremblay; Logic And Discrete Mathematics A Computer Science Perspective ; Pearson Education; Dorling Kindersley India Pvt. Ltd
8. Lipschutz: Set Theory And Related Topics (2ndEdition), Schaum OutlineSeries, Tata
9. McGraw-Hill Publishing Company, New Delhi.
10. H.S.Hall, S.R. Knight: Higher Algebra, Surjit Publications, Delhi.

Competencies of the course:

- Explain the Propositional Calculus in Mathematical Logic.
- Describe Set theory , Relations & Functions
- Explain Ordered sets & Lattices
- Define Circular and hyperbolic functions of a complex variable
- Illustrate the Separation of these functions into real and imaginary parts
- Examine the Factorisation of x^n-1, x^n+1, $x^{2n} - 2x^n a^n \cos n\theta + a^{2n}$
- Define Summation of infinite series by C +iS method

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MT1B01TB-DISCRETE MATHEMATICS & TRIGONOMETRY

Module	Part A	Part B	Part C
I	3	2	1
II	3	2	1
III	3	2	1
IV	3	3	1
Total	**12**	**9**	**4**

MODEL QUESTION PAPER
FIRST SEMESTER
CORE COURSE-MT1B01B-DISCRETE MATHEMATICS & TRIGONOMETRY

Time: 3 hrs. Max.Marks:80

Part A
Short answer questions
(Answer any ten questions. Each question carries 2 mark)

1. Show that $(p \wedge q) \rightarrow (p \vee q)$.
2. State the converse and contra positive of the conditional statement
   "I go to the beach whenever it is a sunny summer day"
3. Find the negation of the proposition "At least 10 inches of rain fell today in Miami ".
4. Let A = {a, b, c, d} and B = $\emptyset$ then find A X B.
5. Let A, B and C be sets. Show that $\overline{A \cup (B \cap C)} = (\overline{C} \cup \overline{B}) \cap \overline{A}$
6. What is the composite of the relations R and S, where R is the relation from {1, 2, 3} to {1, 2, 3,4} with R= {(1, 1), (1, 4), (2, 3), (3, 1), (3, 4)} and S is the relation from {1, 2, 3, 4} to {1, 2, 3, 4} with S= {(1, 0), (2, 0), (3, 1), (3, 2), (4, 1)}.
7. Give an example for a relation which is not symmetric but transitive.
8. Is the poset (Z^+, |) a lattice?
9. If $x$is real show that $\sinh^{-1} x = \log(x + \sqrt{x^2 + 1})$
10. If $\cos(x + iy) = \cos\theta + i \sin\theta$. Show that $\cos 2x + \cosh 2y = 2$
11. What is the imaginary part of $\sinh(2 + 3i)$?.
12. If $\tan\frac{\theta}{2} = \tanh\frac{u}{2}$, Show that $\sinh u = \tan\theta$.

Part B
Brief answer Questions
(Answer any six questions. Each question carries 5 marks)

13. Show that the inclusion relation $\subseteq$ is a partial ordering on the power set of a set S.
14. Prove that the relation R on a set A is transitive if and only if $R^n \subseteq R$ for n = 1, 2, 3….
15. Draw the Hasse diagram for the partial ordering $\{(A, B) | A \subseteq B\}$ on the power set P(S), where S={a,b,c}

16. (a) Define an equivalence relation

(b) Let R be the relation on the set of real numbers such that xRy if and only if x and y are real numbers that differ by less than 1, that is $|x - y| < 1$. Show that R is not an equivalence relation

17. (a) When does a function have an inverse?

(b) Does the function f(n) = 10 – n from the set of integers to the set of integers have an inverse? If so what is it?

18. Let f be a function from A to B. Let S and T be subsets of B. Show that

(a) $f(SUT) = f(S)\, U\, f(T)$

(b) $f^{-1}(S \cap T) = f^{-1}(S) \cap f^{-1}(T)$.

19. Determine the truth value of the following statements if the domain consists of all real numbers

(a) $\exists x\ (x^3 = -1)$ (b) $\exists x\ (x^4 < x^2)$ (c) $\forall x\ ((-x)^2 = x^2)$ (d) $\forall x\ (2x > x)$

20. Prove that $x^7 + 1 = (x = 1) \sum_{r=0}^{2} (x^2 - 2x \cos\frac{(2r+1)\pi}{7} + 1)$. Deduce that $\sin\frac{\pi}{14} \sin\frac{3\pi}{14} \sin\frac{5\pi}{14} = \frac{1}{8}$.

21. Find the real and imaginary part of $\tan^{-1}(x + iy)$

Part C

Long essay type questions

(Answer any two questions. Each question carries 15 marks)

22. Sum to infinity the series

$$\cos x \sin x + \frac{\cos^2 x}{2!} \sin 2x + \frac{\cos^3 x}{3!} \sin 3x + \ \ldots\ldots\ldots\ldots$$

23. (a) If a and r are real numbers and $r \neq 0$, then show that

$$\sum_{j=0}^{n} a.r^j = \begin{cases} \dfrac{a.r^{n+1} - a}{r - 1} & \text{if } r \neq 1 \\ a(n+1) & \text{if } r = 1 \end{cases}$$

(b) Show that the set of rational numbers is countable

(c) Find the sum

$$\sum_{k=50}^{100} k^2 \ \text{ and } \ \sum_{k=99}^{200} k^3$$

24. (a) Determine whether $(\neg p \wedge (p \rightarrow q)) \rightarrow \neg q$ is a tautology.

(b) Show that $p \leftrightarrow q$ and $(p \wedge q) \vee (\neg p \wedge \neg q)$ are logically equivalent

25. Find the sum of the infinite series

$$\cos\theta + \frac{1}{2}\cos 2\theta + \frac{1.3}{2.4}\cos 3\theta + \frac{1.3.5}{2.4.6}\cos 4\theta + \ \ldots\ldots\ldots$$

BACHELOR'S PROGRAMME
MATHEMATICS (CORE COURSE 2) COMMON FOR B.SC MATHEMATICS AND B.SC COMPUTER APPLICATIONS
SECOND SEMESTER

Name of the Course : **MT2B02B18--NUMBER THEORY, CRYPTOGRAPHY ,**

LAPLACE TRANFORMS & CONIC SECTIONS

Duration: One Semester

Total Credits : 3 Credits

Total Lecture Hours: 72 (4 hours /week)

Aim of the course: Classical number theory is introduced in this course. The theory of numbers alwa occupied a unique position in the world of Mathematics. Another topic in this course iss cryptograp which is the only known practical means for protecting information transmitted through pub communication networks. Then it gives geometric definitions of conic sections which models the path planets and satellites.

Course Overview and Context : This course aims to give a simple account of classical number theory and to impart some of the historical background in which the subject evolved. The topics discussed under cryptography are Private key cryptosystem, Private key cryptosystem and knapsack cryptosystem Also it describes conic sections and their properties. .

Syllabus Content

Module 1

Number Theory **(20 hrs)**

Basic properties of congruence , Linear congruences and Chinese remainder theorem (statement and problems only), Fermat's little theorem and pseudoprimes, Wilson's theorem, The sum and number of divisors, Euler's phi-function,
Chapter 4- sections 4.2,4.4 Chapter 5- section 5.2,5.3 ,Chapter 6- section 6.1,chapter7- section 7.2

Module 2

Introduction to Cryptography **(15 hrs)**

From Caesar Cipher to Public key Cryptography, the Knapsack Cryptosystem
(Section 10.1, 10.2 only of text 1)

Module 3

Laplace transforms **(20 hrs)**

Laplace transform, Linearity of Laplace transform, First shifting theorem, Existence of Laplace transform, Transforms of derivatives, Solution of ordinary differential equation & initial value problem, Laplace transform of the integral of a function, Convolution and Integral equations.
Text 2 (Sections 6.1, 6.2 and 6.5)

Module 4

Conic Sections: (17 hrs)

Conic Sections & quadratic equations, Classifying Conic Sections by eccentricity, quadratic equations & rotations, Conics & parametric equations; Cycloid, Polar coordinates, Graphing in Polar coordinates, Areas & lengths in Polar coordinates, Conic Sections in Polar coordinates (Text - 3 Chapter - 10)

Learning Resources

Textbook

1. David M. Burton : Elementary Number Theory, Sixth Edn, TMH.
2. Erwin Kreyszig : Advanced Engineering Mathematics, Ninth Edition, Wiley, India.
3. George B. Thomas Jr. (Eleventh Edition) – Thomas' Calculus, Pearson,

References

1. Manicavachagom Pillay , Natarajan – Analytic Geometry (Part I, Two Dimensions)
2. S.K . Stein – Calculus and analytic Geometry , (McGraw Hill)
3. A. N. Das – Analytic Geometry of Two and Three Dimension (New Central Books)
4. Thomas and Finney - Calculus and analytical geometry (Addison-Wesley)
5. C.Y Hsiung Elementary Theory of Numbers, Allied Publishers
6. Thomas Koshy - Elementary Number Theory with Applications, Academic Press
7. Fernando Rodriguez Villegas: Experimental Number Theory, Oxford University Press
8. Graham Everest, Thomas Ward: An Introduction to Number Theory, , Springer
9. George E. Andrews : Number Theory, HPC.

Competencies of the course: .

- Describe Basic properties of congruence
- Compute Binary and decimal representation of integers
- Introduce Chinese remainder theorem and Fermat's little theorem
- Describe pseudo primes
- Explain Wilson's theorem
- Introduce Euler's phi-function, Euler's Theorem, Properties of the phi-function.
- Define Conic Sections and Classify Conic Sections by eccentricity
- Interpret parametric equations & Polar coordinates of Conic Sections

- Explain Graphing in Polar coordinates
- Introduce Private key cryptosystem
- Analyse Public key cryptosystem
- Describe knapsack cryptosystem.
- Compute Laplace transforms of functions.
- Solve differential equations using Laplace Transforms.
- Compute Laplace transform of the integral of a function.

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MT2B02B18-NUMBER THEORY, CRYPTOGRAPHY, LAPLACE TRANSFORM &CONIC SECTIONS

Module	Part A	Part B	Part C
I	3	2	1
II	3	2	1
III	3	3	1
IV	3	2	1
Total	**12**	**9**	**4**

BACHELOR'S PROGRAMME
MATHEMATICS (CORE COURSE 3) COMMON FOR B.SC MATHEMATICS AND B.SC COMPUTER APPLICATIONS
THIRD SEMESTER

Name of the Course: MT3B03B18-CALCULUS

Duration: One Semester

Total Credits: 4 Credits

Total Lecture Hours: 90 (5 hours /week)

Aim of the Course:

Calculus is the mathematical study of change. The studies of probability, statistics , fluid dynamics electricity to mention a few lead in natural ways to functions of more than one variables. In studying quantities that depend on two or more variables we extend the basic idea of calculus to functions of several variables. We use multiple integrals to calculate quantities that vary over two or more dimensions such as total mass or angular momentum of an object of varying density and the volumes of solids with general curved boundaries..

Course Overview and Context:

This course introduces higher order derivatives, Leibnitz theorem, for higher derivatives of the product of two functions. Series expansions of functions using Maclaurin's theorem and Taylor's theorem are discussed. Some applications of derivatives in finding maxima, minima, point of inflection etc are introduced. The concept of partial derivatives and its properties are also introduced. In integral calculus, certain reduction formulae are discussed. Application of integrals in finding plane area, surface area, arc length, and volume of solids of Revolution are introduced and double and triple integrals and some applications are also introduced.

Syllabus Content:

Module I

Differential Calculus (30 hrs)

Successive Differentiation. Expansion of functions using Maclaurin's theorem and Taylor's theorem. Concavity and points of inflexion.

(Text 2 Chapter - 5, Chapter – 6, Chapter 13)

Module II

Partial Differentiation (20 hrs)

Partial derivatives, The chain rule., Extreme values and saddle points, Lagrange multipliers, Partial derivatives with constrained variables.

(Text 1 Section 14.3 , 14.4, 14.7, 14.8, 14.9)

Module III

Integral Calculus (20 hrs)

Substitution and area between curves, volumes by slicing and rotation about an axis. Volumes by cylindrical shells, Lengths of Plane Curves, Areas of surfaces of Revolution and the theorems of Pappus..

(Text 1 Section 5.6, 6.1, 6.2, 6.3, 6.5)

Module IV

Multiple Integrals. **(20 hrs)**

Double integrals, Areas, Double integrals in polar form, Triple integrals in rectangular coordinates, Triple integrals in cylindrical and spherical coordinates,substitutions in multiple integrals.
(Text 1 Section 15.1, 15.2 (area only) 15.3 , 15.4, 15.6 ,15.7)

Learning Resources

Textbook

1. George B. Thomas Jr. (Eleventh Edition) – Thomas' Calculus, Pearson, 2008.
2. Shanti Narayan and P. K. Mittal– Differential Calculus(S. Chand & Co.) 2008.

References

1. T. M. Apostol – Calculus Volume I & II (Wiley India)
2. Widder – Advanced Calculus ,2nd edition
3. K. C. Maity& R. K. Ghosh – Differential Calculus (New Central Books Agency)
4. K. C. Maity& R. K. Ghosh – Integral Calculus (New Central Books Agency)
5. Shanti Narayan, P.K. Mittal - Integral Calculus – (S. Chand & Co.)
6. Anton: Calculus, Wiley.

Competencies of the course:

- Find the higher order derivative of the product of two functions.
- Expand a function using Taylor's and Maclaurin's series.
- Find points of extreme values attained by a function on a given interval.
- Conceive the concept of Convexity and Concavity of functions.
- Learn about partial derivatives and its applications.
- Find the area under a given curve, length of an arc of a curve when the equations are given in parametric and polar form.
- Find the area and volume by applying the techniques of double and triple integrals .

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MT3B03B18-CALCULUS

Module	Part A	Part B	Part C
I	3	3	1
II	3	2	1
III	3	2	1
IV	3	2	1
Total	**12**	**9**	**4**

BACHELOR'S PROGRAMME
MATHEMATICS (CORE COURSE 4) COMMON FOR B.SC MATHEMATICS AND B.SC COMPUTER APPLICATIONS
FOURTH SEMESTER

Name of the Course:MT4B04B18-VECTOR CALCULUS, THEORY OF EQUATIONS & MATRICES

Duration: One Semester

Credits: 4 credits

Total Lecture Hours: 90 (5 hours/week)

Aim of the Course:

We need a mathematical description of three dimensional spaces to apply calculus in many real world situations. Vectors are used to study the analytic geometry of space, where they give simple ideas to describe lines, planes surfaces and curves in space. Numerical methods are gainfully employed by scientists and engineers to solve problems arising in research and industry.

Course Overview and Context:

This course discusses equations of lines and planes in space, introduces elementary methods to find roots of an equation, gives an overview on relation between roots and the coefficients of an equation.

Syllabus Content:

Module I

(A quick review) **(20 hrs)**

Lines and planes in space.,Vector functions Arc length and Unit tangent vector, Curvatureand Unit normal vector, torsion and Unit Binormal vector, Directional derivatives and gradient vectors , tangent planes and normal lines (ONLY).

(Sections 12.5 , 13.1 , 13.3 , 13.4 , 13.5 , 14.5 , 14.6 (tangent planes and normal lines only)of Text 1)

Module II

Integration in Vector Fields **(30 hrs)**

Line integrals, Vector fields and line integrals: Work, Circulation and Flux, Path Independence, Conservative Fields and Potential Functions (Proofs of theorems excluded), Green's theorem in the plane (Statement and problems only), Surfaces and Area: Parameterisations of surfaces, Implicit surfaces, Surface integrals, Stokes' theorem (Statement and simple Problems only), Divergence theorem only (Statement and Problems only) Gauss' law onwards are excluded.

Sections 16.1 to 16.6 and relevant portions from 16.7 & 16.8 of Text 1

Module III

Theory of Equations **(20hrs)**

Statement of fundamental Theorem of algebra. Deduction that every polynomial of degree n has n and only n roots. Relation between roots and coefficients. Transformation of equations. Reciprocal equations.

(Chapter 6 sections 1 – 10, and chapter 12 of Text 2)

Module IV

Matrices **(20hrs)**

Rank of a Matrix, Non-Singular and Singular matrices, Elementary Transformations, Inverse of an elementary Transformations, Equivalent matrices, Row Canonical form, Normal form, Elementary matrices only.

Systems of Linear equations: System of non-homogeneous, solution using matrices, Cramer's rule, system of homogeneous equations, Characteristic equation of a matrix; Characteristic roots and characteristic vectors. Cayley-Hamilton theorem (statement only) and simple applications

(Text 3, Chapters – 5, 10, 19, 23).

Learning Resources

Text Books:

1. George B. Thomas Jr. (Eleventh Edition) – Thomas' Calculus, Pearson, 2008.
2. Bernard and Child - Higher Algebra, AITBS Publishers, India
3. Frank Ayres Jr : Matrices, Schaum's Outline Series, TMH Edition.

References

1. Erwin Kreyszig : Advanced Engineering Mathematics, 8th ed., Wiley.
2. H.F. Davis and A.D. Snider: Introduction to Vector Analysis, 6th ed., Universal Book Stall, New Delhi.
3. Shanti Narayan, P.K Mittal – Vector Calculus (S. Chand)
4. Merle C. Potter, J. L. Goldberg, E. F. Aboufadel – Advanced Engineering Mathematics (Oxford)
5. Ghosh, Maity – Vector Analysis (New Central books)
6. Quazi ShoebAhamad - Numerical and Statistical Techniques (Ane Books).

Competencies of the course:

- Interpret equations of lines and planes in space

- Explain integration in vector fields.
- Verify Stoke's Theorem, Gauss Divergence Theorem and Green's Theorem.
- Analyse the fundamental theorem of algebra
- Solve equations of nth degree
- Find the equations whose nature of roots is given.
- Interpret the relation between roots and coefficients.
- Apply Descarte's rule of signs to find the number of real and imaginary roots of a given equation.
- Solve system of linear equations using matrices
- Find the characteristic equation of matrices.

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MT4B04B18-VECTOR CALCULUS, THEORY OF EQUATIONS AND NUMERICAL METHODS

Module	Part A	Part B	Part C
I	3	2	1
II	3	3	1
III	3	2	1
IV	3	2	1
Total	**12**	**9**	**4**

B.Sc DEGREE PROGRAMME

MATHEMATICS (CORE COURSE 6) COMMON FOR B.SC MATHEMATICS AND B.SC COMPUTER APPLICATIONS

FIFTH SEMESTER

Name of the Course: **MT5B06B18 - REAL ANALYSIS I**

Duration: One Semester

Total Credits: 4 Credits

Total Lecture Hours: 90 (5 hours /week)

Aim of the Course: Real analysis is a branch of mathematical analysis dealing with the real numbers and real-valued functions of a real variable. In particular, it deals with the analytic properties of real functions and sequences, including convergence and limits of sequences of real numbers, the calculus of the real numbers, and continuity, smoothness and related properties of real-valued functions.

Course Overview and Context: This course provides a systematic approach to the development of the subject Real Analysis. It introduces several fundamental concepts of Real Analysis including the well-ordering *principle,* the completeness axiom, the Archimedean property and the real sequences. Also to the end more abstract notion of a metric space is introduced.

Syllabus Content

Module I

(15hrs) Intervals, Bounded and unbounded sets, supremum, infimum. Order completeness in R. Archimedian property of real numbers. Dedekinds form of completeness property.

(Sections 2.6, 3, 4.1 ,4.2, 4.3, 4.4 of text 1)

Module II

(25hrs) Neighbourhood of a point. Interior point of a set. Open set. Limit point of a set. Bolzano weierstrass theorem for sets. Closed sets, closure of a set. Dense sets. Countable and uncountable sets.

(Sections: 1.1, 1.2, 1.3, 2, 2.1, 2.2, 3.1, 3.2, 3.3, 3.4, 3.5, 4 of chapter 2 of text 1)

Module III (30 hrs)

Real sequences. The range, bounds of a sequence. Convergence of sequences. Some theorems, limit points of a sequence. Bolzano weierstrass theorem for sequences. Limit interior and superior. Convergent sequences. Cauchy's general principle of convergence. Cauchy's sequences. Statements of theorem without proof in algebra of sequences. Some important theorems and examples related to them. Monotonic sequences, subsequences.

(Sections : 1.1,to 1.5, 2.to2,3. 4 to5 ,6 ,6.1 ,7,8 9, 9.1 of chapter 3 of text 1)

Module IV (20 hrs)

Metric Spaces

Definitions & examples, Open & Closed Sets, Convergence & Completeness, Continuity & Uniform Continuity

(Section 1 to 4 of chapter 19 of text 1)

Competencies of the course:

- Explain Real number system and some of its basic properties
- Define the basic concepts needed for real analysis
- Explain Bolzano weierstrass theorem for sets.
- Describe Real sequences,its Convergence Some theorems
- Explain limit points of a sequence
- Interpret Bolzano weierstrass theorem for sequences.
- Examine Limit interior and superior.
- Interpret Cauchy's general principle of convergence & Cauchy's sequences.
- Define Monotonic sequences & subsequences
- Define Metric Spaces and some of its concepts

Learning Resources

Textbook

1. S.C.Malik, Savitha Arora - Mathematical analysis. Revised Second edition.

References

1. Robert G Bartle and Donald R Sherbert –Introduction to real analysis 3rd edition.Wiley
2. Richard R Goldberg – Methods of real analysis 3rd edition , Oxford and IBM Publishing Co (1964)
3. Shanti Narayan – A Course of mathematical analysis , S Chand and Co Ltd(2004)
4. Elias Zako – Mathematical analysis Vol1, Overseas Press, New Delhi(2006)
5. J. M .Howie – Real Analysis, Springer 2007
6. K.A Ross - Elementary Real Analysis, Springer, Indian Reprint

QUESTON PAPER PATTERN

Module	Part A	Part B	Part C
I	3	2	1
II	3	2	1
III	4	3	1
IV	2	2	1
Total	**12**	**9**	**4**

B.Sc. DEGREE PROGRAMME
MATHEMATICS (CORE COURSE 7) COMMON FOR B.SC MATHEMATICS AND B.SC COMPUTER APPLICATIONS
FIFTH SEMESTER

Name of the Course: MT5B07B18 - DIFFERENTIAL EQUATIONS

Duration: One Semester

Credits: 4 credits

Total Lecture Hours: 90 (5 hours/week)

Aim of the Course:

Since the time of Isaac Newton differential equation have been of fundamental importance in the application of Mathematics to the Physical Science. Lately differential equations gained increasing importance in the Biological and Social Science. The integrals of ordinary differential equation are plane curves. Also we should study the differential equation involving one dependant and more than one independent variables that are partial differential equation. Such integrals are space curves and surfaces. Partial differential equation can arise in a variety of ways in Geometry, Physics, etc.

Course Overview and Context:

In this course we are studying the ordinary differential equation involving one independent and one or more dependent variables. The integrals of ordinary differential equation are plane curves. Also we study the differential equation involving one dependant and more than one independent variable that are partial differential equation.

Syllabus Content:

Module I :Ordinary differential equations (20hrs)

Exact differential equations and integrating factors (proof of theorem 2.1 excluded), separable equations and equations reducible to this form, linear equations and Bernoulli equations, special integrating factors and transformations. Orthogonal and oblique trajectories.

(Sections 2.1, 2.2, 2.3, 2.4, 3.1 of Text 1)

Module II (30hrs)

Basic theory of linear differential equations. The homogeneous linear equation with constant coefficients. The method of undetermined coefficients, Variation of parameters, The Cauchy – Euler equation.

(Section 4.1, 4.2, 4.3, 4.4, 4.5 of Text 1)

Module III **(25 hrs)**

Power series solution about an ordinary point, solutions about singular points, the method of Frobenius, Bessel's equation and Bessel Functions, Differential operators and an operator method.

(Section 6.1, 6.2, 6.3, 7.1 of Text 1)

Module IV: Partial Differential equations **(15 hrs)**

Surfaces and Curves in three dimensions, solution of equation of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$. Origin of first order and second order partial differential equations, Linear equations of the first order, Lagrange's method

(Chapter 1, section 1 and 3 & Chapter 2 Section 1, 2 and 4 of text 2)

Competencies of the course:

- Recognise exact differential equations.
- Obtain an integrating factor which may reduce a given differential equation into an exact one and eventually provide its solution.
- Obtain the solution of separable equations and equations reducible to this form.
- Identify linear equation, Bernoulli equations and solve them.
- Obtain orthogonal trajectories and Oblique trajectories of families of curve son a given surface.
- Find the complementary function and particular integrals of linear differential equation.
- Derive solution of homogeneous equations with constant coefficient.
- Understand method of variation of parameters.
- Solve Bessel's equations.
- Obtain power series expansion about an ordinary point.
- Method of solution of the differential equation $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$
- Describe the origin of partial differential equation and distinguish the integrals of first order linear partial differential equation into complete, general and singular integrals.
- Use Lagrange's method for solving the first order linear partial differential equation.

Learning Resources

Textbook

1. Shepley L. Ross - Differential Equations, 3rd ed., (Wiley India).
2. Ian Sneddon – Elements of Partial Differential Equation (Tata Mc Graw Hill)

References

1. A.H.Siddiqi & P. Manchanda – A First Course in Differential Equation with Applications (Macmillian)
2. George. F. Simmons – Differential equation with applications and historical notes (Tata Mc Graw Hill)
3. W.E. Boyce & R.C. Diprima - Elementary Differential Equations and boundary value Problems, (Wiley India)
4. S. Balachandra Rao & H. Ranuradha – Differential Equation with Applications and Programs (Universities Press)
5. R. K. Ghosh & K. C. Maity - An Introduction to Differential Equations (New Central Books Agency)
6. B. K. Dutta – Introduction to Partial Differential Equations (New Central Books) Murrary – .Differential Equations. Macmillian
7. E.A. Coddington - An Introduction to Ordinary Differential Equation, PHI.
8. Sankara Rao - Introduction to Partial Differential Equation,2nd edition, PHI.
9. Zafar Ahsan - Differential Equations and their Applications , 2nd edition, PHI

QUESTON PAPER PATTERN

Module	Part A	Part B	Part C
I	3	2	1
II	3	2	1
III	3	3	1
IV	3	2	1
Total	**12**	**9**	**4**

B.Sc DEGREE PROGRAMME

MATHEMATICS (CORE COURSE 9) COMMON FOR B.SC MATHEMATICS AND B.SC COMPUTER APPLICATIONS

SIXTH SEMESTER

Name of the Course: MT6B09B18 - REAL ANALYSIS II

Duration: One Semester

Total Credits: 4 Credits

Total Lecture Hours: 90 (5 hours/week)

Aim of the Course : This course aims to define Infinite Series, its convergence and some tests to identify the nature of convergence, Continuous functions and some theorems on continuity. It also introduces Riemann Integration, Uniform Convergence of sequence of functions and some tests for it.

Course Overview and Context :

This course covers the fundamentals of mathematical analysis: convergence of sequences and series, continuity, differentiability, Riemann integral, sequences and series of functions, uniformity, and the interchange of limit operations. It shows the utility of abstract concepts and teaches an understanding and construction of proofs.

Syllabus Content

Module I :

Infinite Series (**20 hrs)**

A necessary condition for convergence. Cauchy`s general principle of convergence for a series. Positive term series. A necessary condition for convergence of positive term series. Geometric series. The comparison series $\sum\frac{1}{hP}$ comparison test for positive term series without proof. Cauchy`s root test D'ALEMBERTÈS RATIO test. Raabe's test. Gauss`s test. Series with arbitrary terms. Alternating series. Absolute convergence

(Section 1.1 to 1.4,2 ,2.1 to 2.3,3,4,5,6,9,10,10.1,10.2 of chapter 4 of Text 1)

Module II :

Continuous functions (**25 hrs)**

Continuous function (a quick review). Continuity at a point, continuity in an interval. Discontinuous functions. Theorems on continuity. Functions continuous on closed intervals. Uniform continuity.

(Section 2.1 to 2.4 ,3,4 of chapter 5 of Text 1)

Module III :

Riemann Integration (**30 hrs)**

Definitions and existence of the integral. Inequalities of integrals. Refinement of partitions of integrability. Integrability of the sum of integrable functions. The integrals as the limit of a sum. Some applications. Some integrable functions. Integration and differentiation. The fundamental theorem of calculus.

(Section 1 to 9 of chapter 9 of Text 1)

Module IV :

Uniform Convergence (**15 hrs)**

Point wise convergence. Uniform convergence on an interval. Cauchy`s criterion for uniform convergence. A test for uniform convergence of sequences. Test for uniform convergence of series. Weierstrass`s M-test, Abel`s test. Statement of Dirichelet`s test without proof.

(Section 1 to 3.2 of Text 1)

Competencies of the course:

- Define infinite series of real numbers and its convergence
- Explain some tests to identify nature of convergence of infinite series.
- Describe Continuous functions and some theorems on continuity
- Introduce Riemann Integration.
- Explain the fundamental theorem of calculus.
- Describe Uniform Convergence of sequence of functions.
- Explain tests for uniform convergence of sequences and series.

Learning Resources

Textbook

1. S.C.Malik, Savitha Arora _ Mathematical analysis. Revised Second edition.

References

2. Robert G Bartle and Donald R Sherbert –Introduction to real analysis 3rd edition.Wiley.Richard R Goldberg – Methods of real analysis 3rd edition , Oxford and IBM Publishing Co (1964)
3. Shanti Narayan – A Course of mathematical analysis, S Chand and Co Ltd(2004)
4. Elias Zako – Mathematical analysis Vol1, Overseas Press, New Delhi(2006)
5. J. M .Howie – Real Analysis, Springer 2007
6. K.A Ross - Elementary Real Analysis, Springer, Indian Reprint

QUESTON PAPER PATTERN

Module	Part A	Part B	Part C
I	3	2	1
II	3	3	1
III	3	2	1
IV	3	2	1
Total	**12**	**9**	**4**

SYLLABI
FOR
CORE STATISTICS

STATISTICS

Complementary Course for B.Sc. Mathematics & Physics and BCA
And
Core Course for B.Sc. Computer Applications
I Semester – Statistics - Course I
ST1C01B18 / ST1B01B18 - Descriptive Statistics

Aim of the Course: 1) To introduce the basic concepts in Statistics
2) To develop data reduction techniques

Course Overview and Context :

This course introduces the basic concepts of Statistics. It outlines the techniques to expose the students to many Statistical ideas and rules that underlie Statistical reasoning

Syllabus Content

Credits-3
Hours per week – 4, Total – 72 hours

Module I (20 hours)

Introduction to Statistics, Population and Sample, Collection of Data, Various methods of data collection, Census and Sampling. Methods of Sampling – Simple Random Sampling– stratified sampling – systematic sampling (Method only), Types of data – quantitative, qualitative, Classification and Tabulation, Frequency Table, Diagrammatic representation – Bar diagram, pie diagram; pictogram and cartogram.

Module II (20 hours)

Measures of Central Tendency – Mean; Median; Mode; Geometric Mean; Harmonic Mean and Properties, Partition values- Quartiles, Deciles, Percentiles, Absolute and Relative measures of Dispersion – Range, Quartile Deviation, Box Plot, Mean Deviation, Standard Deviation, Coefficient of Variation.
Graphical representation – histogram, frequency polygon, frequency curve, ogives and stem and leaf chart.

Module III (16 hours)

Raw Moments, Central Moments, Inter Relationships (First Four Moments), Skewness – Measures – Pearson's, Bowley's and Moment Measure; Kurtosis- Measures of Kurtosis – Moment Measure, Measure based on partition values.

Module IV (16 hours)

Index Numbers – definition, limitations, uses, Simple Index Numbers; Weighted Index Numbers – Laspeyer's, Paasche's and Fisher's Index Numbers, Test of Index Numbers, Construction of Index Numbers, Cost of Living Index Numbers – Family Budget Method, Aggregate Expenditure Method.

Reference

1. S.P. Gupta: Statistical Methods (Sultan Chand & Sons Delhi).
2. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons.
3. B.L. Agarwal: Basic Statistics, New Age International (P) Ltd.
4. Parimal Mukhopadhya: Mathematical Statistics, New Central Book Agency (P) Ltd, Calcutta
   Murthy M.N.: Sampling theory and Methods, Statistical Publishing Society, Calcutta

Competencies of the course:

- Develop the fundamentals of Statistics, Present numerical facts through tables and graphs
- Summarise a mass of raw data into a meaningful form
- Describe the fundamental characteristics of data
- Know the general pulse of economy

Blue Print- ST1C01B18 / ST1B01B18 - Descriptive Statistics

Module	Part A 2Marks 10/12	Part B 5 Marks 6/9	Part C 15 Marks 2/4
I	3	2	2
II	4	3	
III	2	3	1
IV	3	1	1

MODEL QUESTION PAPER

B.Sc. DEGREE EXAMINATION

First Semester

Complementary Course (Statistics) for MATHEMATICS, PHYSICS AND BCA &
Core Course (Statistics) for COMPUTER APPLICATIONS

ST1C01B18 / ST1B01B18– DESCRIPTIVE STATISTICS

Time: 3 hours Max.: 80 marks

Use of Scientific calculators and Statistical tables are permitted.

Part A (Short Answer Questions)

Answer ***any ten*** questions.Each question carries 2 marks.

1. Define Simple random sampling
2. Give the sources of secondary data.
3. Distinguish between Census and sample survey.
4. Define Mean deviation.
5. Prove that the sum of deviations of observations from its A.M is zero.
6. Find the standard deviation of the numbers 7,9,16,24,26
7. What is the difference between a Bar diagram and a Histogram.
8. The first two moments of a distribution about X = 4 are 1 and 4. Find the mean and variance.
9. Explain 'Skewness' and 'Kurtosis'.
10. What is commodity reversal test?
11. If $\sum P_k = 360$, $\sum P_o = 300$ find the simple aggregate Index number.
12. Examine whether Laspeyer's Index number satisfies Factor reversal test.

(10x2 = 20 marks)

Part B (Short Essay Questions)

Answer any ***six*** questions. Each question carries 5 marks.

13. Draw an ogive for the following data and hence find Median.

C. I:	25-40	40-55	55-70	70-85	85-100
F:	7	13	21	12	9

14. What are the parts of a table?
15. Explain Box Plot.
16. Find Mean, Median and using the Empirical relation find Mode.

X:	4	8	12	16	20	24
F:	2	7	15	11	9	6

17. Establish the effect of change of origin and scale on standard deviation.
18. Establish the relation between Raw and Central moments.
19. For a distribution the Mean is 10, Variance is 16, $\beta_1 = 1$, $\beta_2 = 4$,Obtain the first four moments about 0
20. The first four moments about 2 of a distribution are 1, 2.5, 5.5, and 16. Comment on its skewness and kurtosis.
21. Explain the various steps involved in the Construction of an Index Number.

(6x5 = 30 marks)

Part C (Essay Questions)

Answer any ***two*** questions. Each question carries 15 marks.

22. (a) What is an Ogive? Explain how the Ogive can be used to find out the Median and Quartiles?

    (b) Explain Stem and Leaf Chart.

23. An Analysis of monthly wages paid to workers in two firms A and B belonging to the same Industry, gives the following results.

	Firm A	Firm B
No. Of wage earners	550	650
Average monthly wages	50	45
Variance of the distribution of wages	90	120

(a) Which firm A or B pays out larger amount as monthly wages?

(b) In which firm A or B is there greater variability in Individual wages?

(c) What are the measures of average and Standard deviation of monthly wages of all the workers in the two firms taken together ?

24. Calculate Laspeyer's, Paasche's and hence Fisher's Index numbers for the following data.

Commodity	Price(Rs per unit)		Quantity (Kg)	
	Base year	Current year	Base year	Current year
A	20	30	12	18
B	30	42	10	14
C	22	34	6	10
D	18	28	8	12

25. (a) Show that $\beta_2 > 1$ for a Discrete distribution.

(b) Calculate Pearson's Coefficient of Skewness for the following distribution

Variable	0-5	5-10	10-15	15 – 20	20 – 25	25 -30	30-35
Frequency	3	5	9	15	21	10	7

(2x15 = 30 marks)

Complementary Course for B.Sc. Mathematics & Physics
And
Core Course for B.Sc. Computer Applications
II Semester – Statistics - Course II
ST2C01B18 / ST2B02B18 – Probability and Random Variables

Aim of the Course: 1) To introduce Probability theory as a foundation for Statistics.
2) To help students understand the basic notions about random variables.

Course Overview and Context :

This course explains step by step development of fundamental principles of Statistics, Probability concepts and Random variables.

Syllabus Content

Credits-3
Hours per week – 4, Total – 72 hours

Module I (16 hours)

Introduction to bivariate data. Correlation-Different types of Correlation. Concepts of Simple, Multiple and Partial Correlations. Simple Linear Correlation – Methods of finding simple linear Correlation – Scatter Diagram, Covariance Method, Rank Correlation (equal ranks).

Module II (16 hours)

Curve Fitting – Method of Least squares- Fitting of Straight Lines, Second Degree Equation, Exponential Curve, Power Curve. Simple Linear Regression – Regression Equations – Fitting and identification, properties.

Module III (20 hours)

Probability Concepts – Random Experiment, Sample Space, Events, Probability Measure, Approaches to Probability – Classical, Statistical and Axiomatic, Addition Theorem (upto 3 evens) Conditional Probability, Independence of events, Multiplication theorem (upto 3 events), Total Probability Law, Baye's Theorem and its applications.

Module IV (20 hours)

Random Variables – Discrete and Continuous, Probability Distributions – Probability Mass Function; Probability Density Function and Cumulative (distribution) function and their properties, change of variables (Univariate only), Bivariate random variables – Definition – Discrete and Continuous, Joint Probability Density Functions, Marginal and Conditional Distributions, Independence of Random Variables.

Reference

1. John E. Freund: Mathematical Statistics, Prentice Hall of India
2. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons
3. S.P. Gupta: Statistical Methods, , Sultan Chand and Sons, New Delhi
4. V.K. Rohatgi: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
5. Mood A.M., Graybill F.A. and Boes D.C. Introduction to Theory of Statistics, McGraw Hill.
6. B.R. Bhat, Modern Probability Theory, New Age International (p) Ltd.

Competencies of the course:

- Determine Degree of relationship between variables
- Nature of relationship and application of method of curve fitting

- Decisions in the face of uncertainty
- Explain the concepts of Probability distributions

Blue Print - ST2C01B18 / ST2B02B18 - Probability and Random Variables

Module	Part A 2Marks 10/12	Part B 5 Marks 6/9	Part C 15 Marks 2/4
I	3	2	1
II	3	2	1
III	3	2	1
IV	3	3	1

MODEL QUESTION PAPER
B.Sc. DEGREE EXAMINATION
Second Semester
Complementary Course (Statistics) for MATHEMATICS and PHYSICS
And
Core Course (Statistics) for COMPUTER APPLICATIONS
ST2C01B18 / ST2B02B18 - PROBABILITY AND RANDOM VARIABLES

Time: 3 hours Max.: 80 marks

Use of Scientific calculators and Statistical tables are permitted.

Part A (Short Answer Questions)

Answer ***any ten*** questions.
Each question carries 2 marks.

1. What are the different types of Correlation?
2. Given the following data, find the correlation co-efficient
   $n = 12$, $\sum x = 30$, $\sum y = 5$, $\sum x^2 = 670$, $\sum y^2 = 285$ and $\sum xy = 334$
3. Show that $2r\sigma_x\sigma_y = \sigma_x^2 + \sigma_y^2 - \sigma_{x-y}^2$
4. Describe the principle of least squares used for estimation of parameters.
5. Find the angle between the regression lines if $\sigma_x = \sigma_y = 0.5$ and $r = \sqrt{2} - 1$.
6. How can the two regression lines be identified?
7. Give the classical definition of probability.
8. Define conditional probability.
9. What is the probability of getting 53 Sundays in a leap year?
10. What are the properties of a p.d.f of a discrete random variable?
11. Distinguish between Discrete and Continuous random variables.
12. Find k if $f(x) = kx(1-x)$; $0 \le x \le 1$ and 0 elsewhere is a p.d.f of a continuous random variable.

(10x2 = 20 marks)

Part B (Short Essay Questions)

Answer any ***six*** questions.
Each question carries 5 marks.

13. Fit a straight line of the form $y = a + bx$ to the following data

X	0	1	2	3	4
Y	0	1.8	3.3	4.5	6.3

14. By the method of least squares find the regression line of Y on X
15. Derive the formula of Rank Correlation coefficient.
16. Show that the correlation coefficient is independent of origin and scale.
17. State and prove addition theorem of probability.
18. (a) Distinguish between Pair wise and Mutual independence of probability.
    (b) Show that A and B are independent if and only if $P(B/A) = P(A/B^c)$
19. Define joint probability distribution function of a continuous random variable and state its properties.
20. If the distribution function of a random variable X is $F(x) = 0$ if $x \leq 0$; x if $0 \leq x \leq 1$; 1 if $x > 1$. Find the p.d.f of $Y = 2X + 3$
21. A continuous random variable X has pdf $f(x) = ax$; $0 \leq x \leq 1$
    a ; $1 \leq x \leq 2$
    $a(3 - x)$; $2 \leq x \leq 3$
    Find (i) a (ii) $P[X \leq 1.5]$

(6x5 = 30 marks)

Part C (Essay Questions)

Answer any ***two*** questions.

Each question carries 15 marks.

22. (a) State and prove Baye's theorem.
    (b) The chances of A, B, C becoming Managers of a company are in the ratio 4 : 2 : 3. The probabilities that a reform will be introduced if A, B , C become Managers are 0.3, 0.5, 0.8 respectively. The reform has been introduced. What is the probability that B is appointed as the Manager?
23. The joint p.d.f of (X,Y) is given in the following table. Find
    (a) The marginal distributions.
    (b) $f(x/ y = 3)$ and $f(y/ x = 2)$
    (c) $P(X \geq 2)$
    (d) Examine whether X and Y are independent.

X / Y	1	2	3

1	0.10	0.20	0.10
2	0.15	0.10	0.18
3	0.02	0.05	0.10

24. From the following data obtain the Pearson's coefficient of correlation

X	10	15	12	17	13	16	24	14	22
Y	30	42	45	46	33	34	40	35	39

25. Given the following data

Variance of x = 9, Regression equations are $8x - 10y + 66 = 0$ and $40x - 18y = 214$.

Find (a) mean values of x and y.

(b) the correlation coefficient between x and y

(c) the standard deviation of y

(2x15 = 30 marks)

Complementary Course for B.Sc. Mathematics & Physics
And
Core Course for B.Sc. Computer Applications
III Semester – Statistics - Course III
ST3C01B18 / ST3B03B18 - Probability Distributions

Aim of the Course: 1) To impart essential knowledge in Probability distributions
2) To expose the real-life applications of Probability distributions

Course Overview and Context :

This course explains the different types of Probability distributions with their real life applications.

Syllabus Content

Credits-4
Hours per week – 5, Total – 90 hours

Module I (25 hours)

Mathematical Expectation – Expectation of a Random Variable, Moments in terms of Expectations, Moment Generating Functions (m.g.f.) and its properties. Characteristic Functions and its Simple Properties, Conditional Expectation.

Module II (25 hours)

Discrete Probability Distributions – Uniform: Geometric; Bernoulli; Binomial; Hyper geometric; Poisson; Fitting of Distributions (Binomial and Poisson). Properties – Mean, Variance, m.g.f., Additive property; recurrence relation for moments (binomial and Poisson) Memorylessness property of Geometric distribution.

Module III (25 hours)

Continuous distributions – Uniform; Exponential; Gamma; Beta (type I and II); Normal; Standard Normal – definitions, Mean, Variance, m.g.f., Additive property, Memorylessness property of exponential distribution Fitting of Normal, Use of Standard Normal Tables for Computation of Various Probabilities.

Module IV (15 hours)

Tchebycheff's Inequality, Weak Law of Large Numbers, Bernoulli's Law of Large Numbers, Central Limit Theorem (Lindberg-Levy form) with proof.

Reference

1. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons
2. Hogg, R.V. and Craig A.T. (1970). Introduction to Mathematical Statistics, Amerind Publishing Co, Pvt. Ltd.
3. V.K. Rohatgi: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
4. Mood A.M., Graybill F.A. and Boes D.C. Introduction to Theory of Statistics, McGraw Hill
5. Johnson, N.L, Kotz, S. and Balakrishnan N. (1994). Continuous Univariate Distribution, John Wiley, New York.
6. Johnson, N.L, Kotz, S. and Kemp, A.W. : Univariate Discrete Distributions, John Wiley, New York.

Competencies of the course:

- Describe the four characteristics of a random variable
- Explain the various properties of some discrete random variables
- Bring out the applications of continuous distributions

- Describe the uses of Central limit theorem

Blue Print - ST3C01B18 / ST3B03B18 - Probability Distributions

Module	Part A 2Marks 10/12	Part B 5 Marks 6/9	Part C 15 Marks 2/4
I	4	3	1
II	3	2	1
III	3	2	1
IV	2	2	1

MODEL QUESTION PAPER
B.Sc. DEGREE EXAMINATION
Third Semester
Complementary Course (Statistics) for MATHEMATICS and PHYSICS
And
Core Course (Statistics) for COMPUTER APPLICATIONS
ST3C01B18 / ST3B03B18 - PROBABILITY DISTRIBUTIONS

Time: 3 hours Max.: 80 marks

Use of Scientific calculators and Statistical tables are permitted.

Part A (Short Answer Questions)

Answer ***any ten*** questions.
Each question carries 2 marks.

1. State the addition theorem on Expectation for two random variables X and Y.
2. Define Moment generating function of a random variable.
3. For any two independent random variables X and Y, show that E (XY) = E(X) E(Y).
4. A balanced die is tossed. A person receives Rs. 10/- if an even number turns up. Otherwise he loses Rs. 8/-. How much money can he expect on the average in the long run?
5. If X is a Geometric random variable, calculate (i) $P(X > 5)$ and (ii) $P(X > 7|X > 2)$. State your conclusion.
6. Show how a hyper geometric distribution arises by giving an example.
7. If for a binomial distribution, p = ½, then what will be the skewness of the distribution?
8. If X follows Uniform distribution over [0,1], then state the distribution of $Y = -2 \log X$.
9. Define Beta distribution of the first type.
10. If $X \sim N(30, 5)$, find $P[26 < X < 40]$.
11. State the Tchebychev's inequality.
12. Two unbiased dice are tossed. If X is the sum of the numbers obtained, show that

$$P[|X - 7| \geq 3] \leq \frac{35}{54}.$$

(10x2 = 20 marks)

Part B (Short Essay Questions)

Answer any ***six*** questions.
Each question carries 5 marks.

13. For a random variable X, $2\log M_X(t) = 30t + 90t^2$. Find its mean, variance and third central moment.
14. State and prove Cauchy-Schwartz inequality.

15. If the joint pdf of a random variable (X,Y) is f(x,y) = x + y; 0 < x < 1, 0 < y < 1. Find covariance between X and Y.
16. Derive the recurrence relation for raw moments of B(n, p).
17. Obtain Poisson distribution as a limiting form of Binomial distribution.
18. Show that Beta distribution of the first type can be obtained from Beta distribution of the second type by means of a transformation.
19. Show that QD: MD: SD = 10: 12: 15, for a Normal random variable with mean μ and Standard deviation σ.
20. State and prove Bernoulli form of Weak Law of Large Numbers. What are its assumptions?
21. How many trials should be performed so that the probability of obtaining atleast 40 successes is atleast 0.95, if the trials are independent and probability of success in a single trial is 0.2?

(6x5 = 30 marks)

Part C (Essay Questions)

Answer any ***two*** questions.

Each question carries 15 marks.

22. (a)Define conditional expectation and conditional variance. (b) If f(x,y)= x+y; 0<x<1, 0<y<1 is the joint p.d.f. of (X,Y), find correlation between X and Y.
23. (a) The following table gives the number of heads obtained in 30 repetitions when 4 biased coins were tossed. Fit an appropriate Binomial distribution and calculate the expected frequencies

No. of heads	0	1	2	3	4
Frequency	2	7	13	6	2

(b) What are the expected frequencies if the coins are assumed to be unbiased?

24. Derive the recurrence relation for central moments of a Normal distribution with parameters μ and σ and hence obtain β_1 and β_2.
25. A random sample of size 100 is taken from an infinite population with mean 75 and variance 256
    (a) Using Tchebychev's inequality, find P[67 < X < 83]
    (b) Using Central limit theorem, find P[67 < X < 83]

(2x15 = 30 marks)

Complementary Course for B.Sc. Mathematics & Physics
And
Core Course for B.Sc. Computer Applications
IV Semester – Statistics - Course IV
ST4C01B18 / ST4B04B18 - Statistical Inference

Aim of the Course: 1) To equip the students with the theory essential for estimation of unknown parameters and testing of hypotheses
2) To expose the students to its real-life applications.

Course Overview and Context :

This course introduces the methods of drawing conclusions about a population by analyzing and studying samples drawn from the population.

Syllabus Content

Credits-4
Hours per week – 5, Total – 90 hours

Module I (20 hours)

Sampling Distributions – definition, Statistic, Parameter, Standard Error, Sampling Distributions of Mean and Variance, χ^2, t and F (without derivation), properties, Inter relationships.

Module II (30 hours)

Concepts of Estimation, Types of Estimation – Point Estimation; Interval Estimation, Properties of Estimation – Unbiasedness, Efficiency; Consistency; Sufficiency. Methods of Estimation – MLE, Methods of Moments, Method of Minimum Variance, Cramer Rao Inequality (without proof), Interval Estimation for Mean, Variance and Proportion.

Module III (20 hours)

Testing of hypothesis- Statistical hypothesis, Simple and composite hypothesis Null and Alternate hypothesis, Type I and Type II errors, Critical Region, Size of the test, P value, Power, Neyman Pearson approach

Module IV (20 hours)

Large Sample tests – Z test, Chi-Square test-goodness of fit, test of independence. Small sample tests –Normal tests, t - test, Chi-square test, F- test.

Reference

1. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons
2. Richard Johnson (2006): Probability and Statistics for Engineers (Miller and Freund). Prentice Hall.
3. S.C Gupta : Fundamentals of Mathematical Statistics, Sultan Chand and Sons.
4. V.K. Rohatgi: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
5. Mood A.M., Graybill F.A. and Boes D.C. Introduction to Theory of Statistics, McGraw Hill.

Competencies of the course:

- Introduce the concepts of Statistic and Sampling distribution
- Explain the method of estimating parameters of a population
- Describe the procedure of testing of hypotheses
- Explain standard error and testing procedures for parameters of a Normal population using large and small samples

Blue Print - ST4C01B18 / ST4B04B18 - Statistical Inference

Module	Part A 2Marks 10/12	Part B 5 Marks 6/9	Part C 15 Marks 2/4
I	2	2	1
II	4	3	1
III	4	2	1
IV	2	2	1

MODEL QUESTION PAPER
B.Sc. DEGREE EXAMINATION
Fourth Semester
Complementary Course (Statistics) for MATHEMATICS and PHYSICS
And
Core Course (Statistics) for COMPUTER APPLICATIONS
ST4C01B18 / ST4B04B18 – STATISTICAL INFERENCE
(Common for MATHEMATICS, PHYSICS and COMPUTER APPLICATIONS)

Time: 3 hours **Max.: 80 marks**

Use of Scientific calculators and Statistical tables are permitted.

Part A (Short Answer Questions)

Answer ***any ten*** questions.
Each question carries 2 marks.

1. What do you mean by a sampling distribution?
2. Define t statistic. Give an example of a statistic that follows t-distribution.
3. Differentiate between Point estimation and Interval estimation.
4. If T is an unbiased estimate of θ, examine whether T^2 is unbiased for θ^2.
5. Explain the method of moments for estimating unknown parameters of a population.
6. Give the interval estimate of mean of a normal distribution when standard deviation is known.
7. Explain the terms Type I error and Type II error.
8. Define Power of a test.
9. To test the hypothesis that 25% of articles produced by a machine are defective against the alternative that 50% are defective, the test suggested was to take a sample size 5 and reject the hypothesis if number of defectives is greater than 1. Find the significance level and power of the test.
10. Distinguish between simple and composite hypotheses with an example each.
11. Give the expression for the test statistic for testing the equality of the means of two normal populations when small samples are drawn from the populations with the same but unknown standard deviation.
12. Find the value of the χ^2 statistic from the following contingency table

	A_1	A_2
B_1	14	16
B_2	6	4

(10x2 = 20 marks)

Part B (Short Essay Questions)

Answer any ***six*** questions.

Each question carries 5 marks.

13. A sample of size 16 is drawn from a Normal population has variance 5.76. Find c such that P[$|\bar{x}$ - μ| < c] = 0.95, where $\bar{x}$ is the sample mean and μ is the population mean.
14. If $x_1, x_2, x_3, \ldots x_{16}$ is a random sample from a Normal population with mean 6 and standard deviation 2, find the distribution of

    (a) $\bar{x}$ (b) $\sum_{i=1}^{16}\left(\frac{x_i-6}{2}\right)^2$ (c) $\frac{\bar{x}-6}{\sqrt{\sum_{i=1}^{16}(x_i-6)^2}}$
15. Examine whether sample variance is an unbiased estimate of the population variance for a normal population. If not suggest an unbiased estimate for the population variance
16. State the Cramer –Rao inequality. Examine whether the parameter λ of a Poisson distribution admits a minimum variance unbiased estimator. Also find the lower bound for the variance of any unbiased estimator of λ.
17. A sample poll of 100 voters in a given district indicated that 55 of them were in favour of a particular candidate. Find a 95% confidence interval for the proportion of voters in favour of that candidate.
18. The hypothesis H_0: θ = 2 is accepted against H_1: θ = 5 if $X \leq 3$, where X is the observation on a sample of size 1 from an exponential population with mean θ. Find α and β.
19. Obtain the most powerful test for testing H_0: θ = ¼ against H_1: θ = ½ based on a sample of size 2 say x_1 and x_2, if the p.d.f. in the population is $f(x) = \theta(1-\theta)^x$;

    x = 1, 2, 3, . .
20. Explain the procedure for testing the equality of variances of two Normal populations when samples of sizes less than 30 are drawn from the populations.
21. Four coins are tossed 80 times. The distribution of the number of heads obtained are as follows

No. of heads:	0	1	2	3	4	Total
Frequency:	4	20	32	18	6	80

    Apply χ^2 test and test at 1% level whether the coins are unbiased.

(6x5 = 30 marks)

Part C (Essay Questions)

Answer any ***two*** questions.

Each question carries 15 marks.

22. (a)Let s_1 and s_2 be the sample standard deviations of two random samples of sizes n_1 and n_2 from two normal populations having the same unknown variance σ^2. Derive the probability distribution of

$$\frac{n_1 s_1^2 / n_1 - 1}{n_2 s_2^2 / n_2 - 1}$$

(b)The following data on the measurements of the fat content of two kinds of Ice-creams brand A and brand B yielded the following results

Brand A	13.5	14.0	13.6	12.9	13.0
Brand B	12.9	13.0	12.4	13.5	12.7

Find P[$\sigma_1^2 > 5.75\ \sigma_2^2$] where σ_1^2 and σ_2^2 are the population variances

23. (a) X is uniformly distributed in (a,b). A sample of size 5 consists of the observations 3.1, 0.2, 1.6, 5.2 and 2.1. Find the moment estimates of a and b.

(b) A sample of 100 voters were asked to vote in a gallop poll. 55% of them voted in favour of the candidate. Find 95% and 99% confidence interval for proportion of voters who are in favour of the candidate.

24. Obtain the best critical region of size α for testing H_0: μ = 6 against H_1: μ = 6.5, where μ is the mean of a Normal population with variance 1, using a sample of size n.

Also find the power of this test when n = 4, 9, 16 and 25

25. Given the following contingency table test whether there is any association between hair colour and eye colour.

Eye colour	Hair colour		
	Blonde	Brown	Black
Blue	15	5	20
Grey	20	10	20
Brown	25	15	20

(2x15 = 30 marks)

Core Course for Computer Applications
IV Semester
ST4B05B18 – Sample Survey and Design of Experiments

Aim of the course: The objective of the course is to provide a sound practical background to sampling and particularly to design and analysis of sample survey. The course covers a broad range of situations in which sampling is used, with emphasis placed on sample surveys. The central aim is to provide the sound general background needed for carrying out a sample survey, including both practical aspects and the essential details on design and analysis.

Course Overview and Context: This course provides an introduction to sampling theory. Three major topic areas are addressed:

- Simple random sampling
- Stratified random sampling
- Systematic sampling

This course also gives an introduction to the lay out and analysis of basic designs namely CRD,RBD,LSD.

Syllabus Content

Credits-4

Hours per week – 5, Total – 90 hours

Module I **(15 Hours)**

Basic concepts: Census and Sampling, Principal steps in a sample survey- Simple random sampling: Simple random sampling with and without replacement, unbiased estimates of the population mean and population total-their variances and estimates of the variances,

Module II **(30 Hours)**

Stratified random sampling: Estimation of the population mean and population total-their variances and estimates of the variances, proportional allocation and Neyman allocation of sample sizes, cost function – optimum allocation, comparison with simple random sampling, Systematic Sampling: Linear and Circular Systematic Sampling (basic concepts only)

Module III **(25 Hours)**

Principles of experimentation, linear estimation, estimability of parametric functions BLUE, Gauss Markov theorem(without proof), ANOVA of one way & two way classified data

Module IV **(20 Hours)**

Lay out and analysis of basic designs CRD, RBD, LSD missing plot techniques

Learning Resources

Textbooks

1. D. Singh and F.S. Choudhary: Theory and Analysis of sample survey Designs, Wiley Eastern Ltd.
2. S.C. Gupta and V.K. Kapoor: Fundamentals of Applied Statistics, Sultan Chand & Co. New Delhi
3. Cochran W.G.: Sampling Techniques, Wiley Eastern Ltd.
   Design and Analysis of Experiments 2/e (1986) M.N. Das and N.C. Giri, Wiley Eastern Limited,
4. Linear Estimation and Design of Experiments (1987) D.D. Joshi, Wiley Eastern Limited.

References

1. Murthy M.N.: Sampling Theory and Methods, Statistical Publishing Society, Calcutta.
2. Sukhatme and Sukhatme: Sample survey methods and its applications, Indian Society of Agricultural Statistics.
3. Design and Analysis of Experiments 5/e (2001) D.C. Montgomery, John Wiley and Sons, Inc.

Competencies of the course:

- Define simple random sampling (with and without replacement)
- Explain procedure of selecting simple random sample
- Explain stratified sampling and systematic sampling
- Illustrate ANOVA of one way and two way classified data
- Explain the layout and analysis of basic designs

Blue Print – ST4B05B18 – Sample Survey and Design of Experiments

Module	Part A 2Marks 10/12	Part B 5 Marks 6/9	Part C 15 Marks 2/4
I	3	3	1
II	3	2	1
III	4	2	1
IV	2	2	1

Core Course for Computer Applications
V Semester
ST5B06B18 – Environmental Studies, Human Rights and Numerical Methods.

Aim of the Course

- Environmental Education encourages students to research, investigate how and why things happen, and make their own decisions about complex environmental issues by developing and enhancing critical and creative thinking skills. It helps to foster a new generation of informed consumers, workers, as well as policy or decision makers.
- Environmental Education helps students to understand how their decisions and actions affect the environment, builds knowledge and skills necessary to address complex environmental issues, as well as ways we can take action to keep our environment healthy and sustainable for the future. It encourages character building, and develop positive attitudes and values.
- To help the students in acquiring the basic knowledge about environment and the social norms that provide unity with environmental characteristics and create positive attitude about the environment.

Course Overview and Context: The syllabus of environmental studies includes five modules including human rights. The first two modules are purely environmental studies according to the UGC directions. The second two modules are strictly related with the core subject and fifth module is for human rights.

Syllabus Content
Credits-4
Hours per week – 5, Total – 90 hours

Module I: **(20 Hours)**

Unit 1 :Multidisciplinary nature of environmental studies
Definition, scope and importance
Need for public awareness.

Unit 2 : Natural Resources :
Renewable and non-renewable resources : Natural resources and associated problems.
a) **Forest resources** : Use and over-exploitation, deforestation, case studies.Timber extraction, mining, dams and their effects on forest and tribal people.
b) **Water resources** : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) **Mineral resources** : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) **Food resources** : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) **Energy resources**: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
f) **Land resources**: Land as a resource, land degradation, man induced landslides, soil erosion and desertification

- Role of individual in conservation of natural resources.

- Equitable use of resources for sustainable life styles.

Unit 3: Ecosystems

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the given ecosystem:- Forest ecosystem

Module II: (25 Hours)

Unit 1: Biodiversity and its conservation

- Introduction
- Biogeograhical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- India as a mega-diversity nation
- Hot-sports of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
- Endangered and endemic species of India

Unit 2: Environmental Pollution

Definition

Causes, effects and control measures of: -

- Air pollution
- Water pollution
- Soil pollution
- .Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

Pollution case studies

Disaster management: floods, earthquake, cyclone and landslides.

Unit 3: Social Issues and the Environment

- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management

- Resettlement and rehabilitation of people: its problems and concerns, Case studies
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies
- Consumerism and waste products
- Environment Protection Act
- Air (Prevention and Control of Pollution) Act
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

Module III **(25 Hours)**

Unit 1- Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights).

Unit-2 Human Rights and United Nations – contributions, main human rights related organs- UNESCO,UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights.

Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities

Unit-3 Environment and Human Rights - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment

Conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghats- mention Gadgil committee report, Kasthurirangan report. Over exploitation of ground water resources, marine fisheries, sandmining etc.

Module IV **(20 Hours)**

Solution to algebraic and transcendental equations:- Bisection Method, Iteration method, Regula -falsi method, Newton-Raphson method. Solution to Simultaneous linear equations:- Gauss elimination method, Gauss-Jordan methods, Jacobi's method, Gauss-Seidel method

Internal: Field study

- Visit to a local area to document environmental grassland/ hill /mountain
- Visit a local polluted site – Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds etc
- Study of simple ecosystem-pond, river, hill slopes, etc

(Field work Equal to 5 lecture hours)

Books for study

- Bharucha, E. (2010). *Text Book for Environmental studies for undergraduate Courses*, University Grants Commission, New Delhi.
- Chatrath, K. J.S., (ed.), Education for Human Rights and Democracy (Shimla: Indian Institute of Advanced Studies, 1998)

References

- Agarwal, K. C. (2001). *Environmental Biology*, Nidi Publishers Ltd, Bikaner.
- Gupta, S.C. and. Kapoor, V.K .(2014). *Fundamentals of Applied Statistics*, Sultan Chand & Co.New Delhi.
- Clark.R.S., *Marine Pollution*, Clanderson Press Oxford (Ref)
- Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T.2001 *Environmental Encyclopedia*, Jaico Publ. House. Mumbai. 1196p .(Ref)
- Dc A.K., *Environmental Chemistry*, Wiley Eastern Ltd.(Ref)
- Down to Earth, Centre for Science and Environment (Ref)

Competencies of the course:

- To know more about Environment
- To study about different types of resources
- To develop the sense of awareness among the students about the environment and its various problems and to help the students in realizing the inter-relationship between man and environment and helps to protect the nature and natural resources.
- To have a basic idea about Human rights.
- To get familiar with different methods for obtaining solution to a system and a system of linear equations.

Blue Print – ST5B06B18 – Environmental Studies, Human Rights and Numerical Methods.

Module	Part A 2Marks 10/12	Part B 5 Marks 6/9	Part C 15 Marks 2/4
I	3	2	0
II	2	2	1
III	3	2	1
IV	4	3	2

EVS MODEL QUESTION PAPER

B.Sc. DEGREE EXAMINATION

Fifth Semester

Core Course (Statistics) for COMPUTER APPLICATIONS

ST5B06B18 – Environmental Studies, Human Rights and Numerical Methods.

Time: 3 hours Max.: 80 marks

Use of Scientific calculators and Statistical tables are permitted.

Part A (Short Answer Questions)

Answer ***any ten*** questions.

Each question carries 2 marks.

1. Define deforestation?
2. Give the classification of Mineral Resources.
3. Write short notes on Desertification
4. Write a note on measuring diversity?
5. What are the values of biodiversity?
6. Write a note on cultural rights.
7. What are the duties of UNESCO?
8. Write a note on rights of children.
9. What is the difference between algebraic and transcendental equations?
10. What is Newton – Raphson formula?
11. Define the term Pivot
12. Give the form of First derived system in Gauss Elimination method.

(10x2 = 20 marks)

Part B (Short Essay Questions)

Answer any ***six*** questions.

Each question carries 5 marks.

13. What is impact of human activities on Water resources?
14. What are the effects of mineral exploitation on environment?
15. Explain the structure of an ecosystem
16. Why forest ecosystem important to world?
17. Explain fundamental rights .
18. Explain about three generations of Human rights.

.

19.Solve the system of equations using Gauss Jordan method with Pivoting

$$x_1 + x_2 + x_3 = 1$$
$$4x_1 + 3x_2 - x_3 = 6$$
$$3x_1 + 5x_2 + 3x_3 = 4$$

20.Briefly explain Jacobi's method for solving a system of simultaneous equations

21.Explain briefly Gauss Elimination method to find solution to a system of linear equations

(6x5 = 30 marks)

Part C (Essay Questions)

Answer any ***two*** questions.

Each question carries 15 marks.

22.Discuss the cause , effects and control measures of water pollution?

23.Explain about rights of Scheduled caste ,Scheduled Tribes and Other minorities.

24.Solve the system

$$6x + y + z = 20$$

$$x + 4y - z = 6$$
$$x - y + 5z = 7$$

Using Gauss Seidal method.

25.Explain Jacobi's method in detail.

(2x15 = 30 marks)

Core Course for Computer Applications
VI Semester
ST6B07B18 – Optimization Techniques

Aim of the course: The objective of this course is to introduce students to use quantitative methods and techniques for effective decision–making; model formulation and applications that are used in solving business decision problems

Course Overview and Context: Operations research helps in solving problems in different environments that needs decisions. The course cover topics that include: linear programming, Transportation, Assignment, and CPM/PERT techniques. Analytic techniques and computer packages can be used to solve problems facing business managers in decision environments

Syllabus Content

Credits-4

Hours per week – 5, Total – 90 hours

Module I **(15 Hours)**

Operations Research: Origin and Development of OR, Objectives of OR, Modeling and types of models in OR.

Module II **(30 Hours)**

Linear Programming: Mathematical formulation of LPP, Graphical and Simplex methods of solving LPP – Duality in Linear Programming.

Module III **(30 Hours)**

Transportation and Assignment Problems: North – West Corner Rule, Row Column and Table Minima Method – Vogel's Approximation Method. Assignment Problem, Hungarian Algorithm of Solution.

Module IV **(15 Hours)**

Network Analysis: Drawing the Network Diagram – Analysis of Network, Calculation of Critical Path – PERT, Expected Completion Time and its Variance.

Learning Resources

Textbooks

1. KantiSwarup, Gupta P.K., Manmohan: Operations Research, Sultan Chand and Sons, New Delhi.
2. Gupta R.K.: Operations Research, Krishna PrakashanMandir, Meerut.
3. Schaum's Outline Series: Operation Research.

References

1. Hadley G.: Linear Programming, Addison – Wesley.
2. Gupta and Manmohan: Linear Programming, Sultan Chand & Sons, New Delhi.
3. Taha: Operations Research, Macmillian.
4. Goel& Mittal: Operations Research, Pragati Prakashan, Meerut.
5. V.K. Kapoor: Operations Research, Sultan Chand & Sons, New Delhi.

Competencies of the course:

- Define Linear programming problems
- Explain simplex method

- Define transportation problem and assignment problem
- Explain Hungarian algorithm
- Explain CPM and PERT

Blue Print – ST6B07B18 – Optimization Techniques

Module	Part A 2Marks 10/12	Part B 5 Marks 6/9	Part C 15 Marks 2/4
I	3	2	0
II	2	3	1
III	3	3	2
IV	4	1	1